apollo™

The evidence base

Corin
Connected Orthopaedic Insight

apollo™

apollo™

Dynamic Balance
Plan. Implement. Learn.

apollo™

Contents

Balance and Alignment

Accuracy

Satisfaction and Survivorship

ROI

Ease of Use

Balance and Alignment

1. Balance is difficult to reproduce manually, and standardization is needed

|	
Title	Arthroplasty Surgeons Differ in Their Intraoperative Soft Tissue Assessments: A Study in Human Cadavers to Quantify Surgical Decision-making in TKA
Authors	Shady SS, Sculco PK, Kahlenberg CA, Mayman DJ, Cross MB, Pearle AD, Wright TM, Westrich GH, Imhauser CW
Publication	Clin Orthop Relat Res. 2022 Aug 1;480(8):1604-1615

Methods
In seven cadavers, five knee surgeons with varying levels of experience and one chief orthopaedic resident independently evaluated soft tissue balance at different flexion angles and selected polyethylene inserts based on their assessments. Pliable force sensors measured the applied loads, a 3D motion capture system recorded knee kinematics, and dynamic analysis software estimated medial and lateral gaps. The study aimed to determine whether surgeons applied different moments, assessed different gaps, and whether applied moments were associated with insert thickness choice.

Results
The applied moments differed among surgeons, with the largest mean differences occurring in varus in midflexion (16.5 Nm; p = 0.02) and flexion (7.9 Nm; p < 0.001).

The measured gaps differed among surgeons at all flexion angles, with the largest mean difference occurring in flexion (1.1 ± 0.4 mm; p < 0.001).

In all knees except one, the choice of insert thickness varied by 1 mm among surgeons.

Conclusion
Subjective soft tissue assessment yielded 1 to 2 mm of variation in their choice of insert thickness. Therefore, developers of tools to standardize soft tissue assessment in TKA should consider controlling the force applied by the surgeon to better control for variations in insert selection.
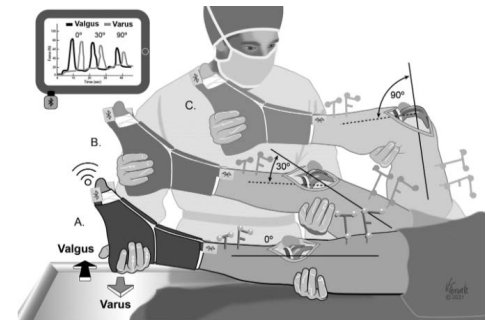
Balance and Alignment

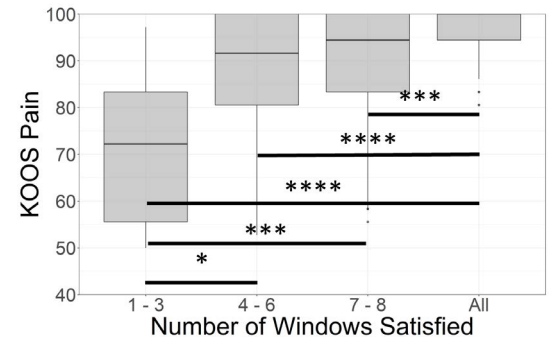## 2.a Robotic ligament balance correlates with better outcomes, less pain

Title	Intra-Operative Laxity and Balance Impact 2-Year Pain Outcomes in TKA: A Prospective Cohort Study
Authors	Wakelin EA, Ponder CE, Randall AL, Koenig JA, Plaskos C, DeClaire JH, Lawrence JM, Keggi JM
Publication	Knee Surg Sports Traumatol Arthrosc. 2023 Oct 14

Methods

A prospective study investigating 310 robotically assisted TKAs was performed. Final intra-operative joint gap data were recorded using a digital tensioner and component alignment data were recorded by the robotics system. Patient demographics and KOOS/HSS satisfaction were recorded at 2 years post-op. A random search Simulated Annealing (SANN) optimization algorithm was used to determine global optimum laxity and balance windows at different flexion angles which maximized the 2-year KOOS pain scores. The windows were combined to determine the impact of achieving optimal laxity and balance throughout flexion.

Results

Nine laxity and balance windows were defined: Extension (Med lax: -2.0 to 2.5 mm, Lat lax: -0.5 to 2.5 mm, Balance: -3.0 to 0.0 mm), mid-flexion (Med lax: -1.0 to 2.5 mm, Lat lax: -0.5 to 3.0 mm, Balance: -2.0 to 2.0 mm), and flexion (Med lax: -2.0 to 3.5 mm, Lat lax: -2.0 to 1.5 mm, Balance: -3.0 to 3.0 mm). When all windows were satisfied, the greatest difference in KOOS pain score was observed (100.0 vs 94.4, p < 0.0001). The highest percentage of knees satisfying the Patient Acceptable Symptom State (PASS) for KOOS pain was also observed in knees which satisfied all windows compared to knees which did not (93% vs 71%, p = 0.0009).

Conclusion

Intra-operatively measured joint gaps are associated with all KOOS sub-score outcomes at 2 years after TKA.
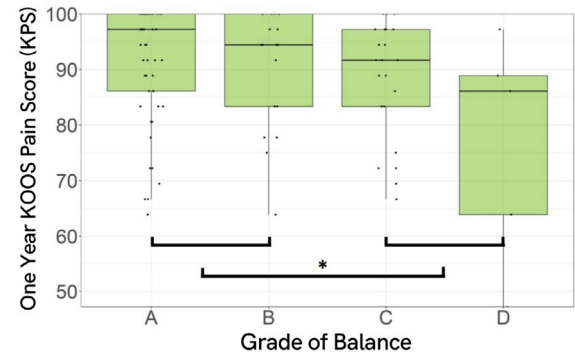
Balance and Alignment

2.b Robotic ligament balance correlates with better outcomes, less pain

Methods
The data of 134 consecutive patients enrolled in a prospective trial was reviewed. Each TKA was graded according to the final recorded mediolateral ligament balance achieved at 10° and 90°: A) <1mm with an implanted insert thickness equal to planned; B) <1mm; C) <2mm; D) >2mm. The 1-year KOOS Pain Score (KPS) for each knee grade were compared.

Results

- Patients with a higher grade of balance (A and B) had higher 1-year KPS compared to knees rated C and D, see figure.

- Patients with a high grade of balance (A and B) and with KPS < 90 had lower PROMIS mental health scores compared to patients reporting KPS > 90.

- Grade A and B patients who scored KPS > 90 were more likely to respond with "my expectations were too low", and with "the knee is performing better than expected" compared to Grade A and B patients who scored KPS < 90.

- In this series, the percentage of knees balanced to within 1 and 2 mm was 75% and 95% respectively, and overall patient satisfaction was 99%.

Conclusion
A knee balanced with a robot to within 1mm of difference between the medial and lateral sides in both flexion and extension correlated with higher KPS at 1 year.

2.c Robotic ligament balance correlates with better outcomes, less pain

Title	Impact of Intra-Operative Predictive Ligament Balance on Post-operative Balance and Patient Outcome in TKA: A Prospective Multicenter Study.
Authors	Keggi JM, Wakelin EA, Koenig JA, Lawrence JM, Randall AL, Ponder CE, DeClaire JH, Shalhoub S, Lyman S, Plaskos C
Publication	Arch Orthop Trauma Surg 2021 Jul 13

Methods 280 patients were prospectively enrolled and followed up at 3, 6, and 12 months post-operatively. Patients were divided into those in which a Predictive Plan with the BalanceBot was used (PP) and those in which it was not (NPP). Optimal balance difference between PP and NPP was defined and compared using area-under-the-curve analysis (AUC). Outcomes were then compared according to the results from the AUC.

Results
- AUC analysis yielded a mediolateral balance threshold of 1.5mm, in which the PP group achieved a higher rate of balance throughout flexion compared to the NPP group, fig 1 A B.
- Higher KOOS scores were observed in knees balanced within 1.5mm across all sub-scores at various time points, fig 2.
- Patients with <1.5 mm flexion laxity medially or laterally had an increased likelihood of achieving the Patient Acceptable Symptom State (PASS)[1] for KOOS Pain at 12 months.

Conclusion Use of Predictive Balancing with the BalanceBot improved final balance in TKA. Improved outcomes were found in balanced knees. Limiting medial and lateral flexion laxity resulted in an increased likelihood of achieving the PASS for KOOS Pain.

1.   Collenny JW. et al. J Bone Joint Surg Am. 2019 Jun 5;101(11):995-1003.
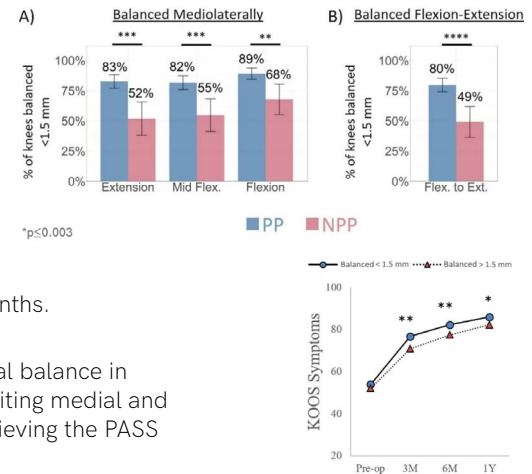
Balance and Alignment

3. Balance has a greater impact on outcomes than alignment does

Title	Impact of Component Alignment and Soft Tissue Release on 2-Year Outcomes in Total Knee Arthroplasty.
Authors	J.M. Vigdorchik, E.A. Wakelin, J.A. Koenig, C.E. Ponder, C. Plaskos, J.H. DeClaire, J.M. Lawrence, J.M. Keggi
Publication	J Arthroplasty. 2022 Oct;37(10):2035-2040

Methods

In a multicenter study, soft tissue releases during TKA were prospectively documented in 330 robotic-assisted TKAs. Knee Injury and Osteoarthritis Outcome Scores (KOOS) were captured postoperatively. Delphi analysis was used to determine inlier and outlier component alignment boundaries:

Table 2
Outlier Boundaries: Results of Delphi Analysis of 6 Fellowship Trained Orthopedic Surgeons.

Angle	'Inlier' Range
Tibial Coronal	±3°
Femoral Coronal	±3°
Femoral Axial	3° Int to 6° Ext
Tibiofemoral Coronal	3° Valgus to 4° Varus
Tibiofemoral Axial	3° Int to 6° Ext

Results

No significant differences were found between any individual or grouped inlier and outlier alignment criterion and KOOS at any timepoint. A higher proportion of patients achieved Minimal Clinically Important Difference for pain at 6 months for those having no releases versus released (92.3% versus 81.0%, p = 0.021). No significant associations were found between preoperative deformity and preoperative or postoperative KOOS.

Conclusion

The addition of soft tissue releases after bony cuts is associated with worse KOOS scores out to 2 years and was more prevalent in knees with worse deformity, while no such association was found for alignment.
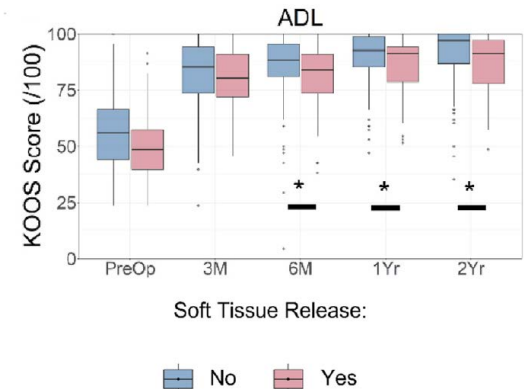
4. Fewer releases with predictive balancing

Title	Soft-Tissue Release Rates In Robotic-Assisted Gap-Balancing And Measured-Resection TKA.
Authors	Lawrence JM, Keggi JM, Koenig JA, Ponder CE, Randall AL, DeClaire JH, Shalhoub S, Plaskos C
Publication	Bone & Joint Surgery Orthopaedic Proceedings, Vol. 102-B, No. SUPP_2. Feb 2020

Methods   Soft tissue releases were recorded in robotic-assisted TKA with predictive gap balancing (n=615) and compared to conventional TKA using literature data[1].

Results   The percentage of knees requiring no releases was significantly higher in the predictive balancing group (69% vs 33%, p < 0.001). This trend persisted for both varus and valgus deformities (Table 1).

Conclusion   OMNIBotics Predictive Balance technique resulted in significantly lower rates of soft tissue releases compared to conventional TKA.

Comparison of Soft Tissue Release Rate Between BalanceBot and Conventional

TKA's requiring zero soft tissue release (%)

BalanceBot — Conventional[1]
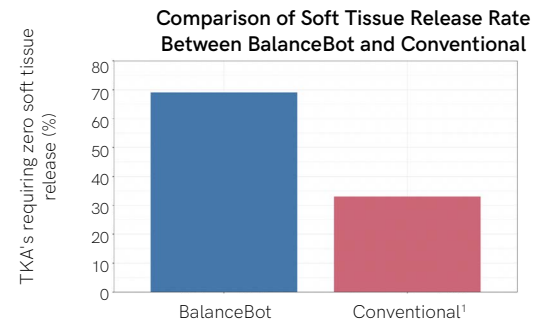
Table 1. Percentage of knees with no releases

	Varus	Neutral	Valgus	Overall
Conventional (n=1,216)[1] (Measured resection, femur first)	37%	59%	17%	33%
Predictive Balance (n=615) (BalanceBot, tibia first)	67%*	89%*	73%*	69%*

*p < 0.05, compared to Conventional group

1.   Peters CL et al. Lessons learned from selective soft-tissue release for gap balancing in primary TKA: an analysis of 1216 consecutive TKAs: AAOS exhibit selection. J Bone Joint Surg Am. 2013 Oct 16;95(20):e152.

Balance and Alignment

5. Alignment strategies that rely on bone anatomy alone lead to unacceptable variability in laxity

Title	Laxity, Balance, and Alignment of a Simulated Kinematic Alignment Total Knee Arthroplasty
Authors	Edelstein AI, Wakelin EA , Plaskos C, Suleiman LI
Publication	Arthroplast Today. 2023 Sep 18:23:101204

Methods

We used data from 382 robot-assisted TKA performed with a digital joint tensioner to simulate TKA with a pure resurfacing KA technique for both femur and tibia. All knees had the posterior cruciate ligament retained. Knees were subdivided into 4 groups based on preoperative coronal alignment: valgus, neutral, varus, and high varus. Medial and lateral laxity in extension and flexion, balance in extension and flexion, and coronal plane alignment were compared between groups using analysis of variance testing.

Results

In simulated pure resurfacing KA TKA across a range of preoperative coronal plane deformities, only 11%-31% of knees would have mediolateral extension ligament balance within ±1 mm, and 20%-41% would have a medial flexion gap that is looser than the lateral flexion gap. Over 45% of knees would have coronal hip-knee ankle angle >3 degrees from mechanical neutral.

Breakdown of coronal balance distribution in extension according to preoperative coronal deformity.

Balance (M-L)	Valgus (<−3°)	Neutral (±3°)	Varus (>3°)	High varus (>10°)
± 1 mm	31%	13%	19%	11%
± 2 mm	63%	30%	43%	31%
± 3 mm	81%	43%	57%	51%
M > L	56%	21%	13%	17%

Conclusion

In simulations of pure resurfacing KA TKA, there was wide variability in the resulting laxity and alignment outcomes. Most knees had alignment and balance outcomes outside of normally accepted ranges. Techniques that deviate from pure resurfacing in order to achieve balance appear favorable.

6. Alignment contributes more towards laxity variability than implant design does

Title	Midflexion Laxity in TKA: Alignment Matters, Implant Choice Does Not.
Authors	Forlenza E, Orsi AD, Plaskos C , Slotkin E, Kreuzer S, Karas V
Publication	ISTA Conference 2023

Methods

Ligament balance data was collected using a robotic ligament tensioner at a static tensioning force of 70-90N in 154 consecutive TKAs. A tibia-first resection technique and a single-radius cruciate-retaining implant was used for all cases. Simulation software was used to virtually replace the single-radius with a multi-radius design of equivalent size, by aligning the implants to have equivalent gaps at 10° and 90° flexion.
Two alignment techniques were assessed by aligning the implants in gap balanced (GB) and measured resection (MR) positions.

Results

Technique had a greater contribution to mean laxity variability compared to the implant design at 0° (1.3±1 vs. 0.7±0.2 mm, p<0.001), 20° (1.5±1.2 vs. 0.4±0.2 mm, p<0.001), 30° (1.5±1.2 vs. 0.4±0.2 mm, p<0.001), 45° (1.5±1.1 vs. 0.2±0.2 mm, p<0.001), and 60° (1.5±1.1 vs. 0.2±0.2 mm, p<0.001). Single-radius implant laxity was 0.7 mm looser at full extension and 0.4 mm tighter in midflexion compared to the multi-radius design.

MR had greater lateral ML imbalance compared to GB in extension (-0.7±3.1 vs 0.1±1 mm, p<0.01), midflexion (-1.4±2.7 vs -0.4±1 mm, p<0.001), and flexion (-2±2.9 vs -0.4±0.9 mm, p<0.001).

Laxity Difference for Technique (MR vs GB) and Implant (Single vs Multi-Radius)
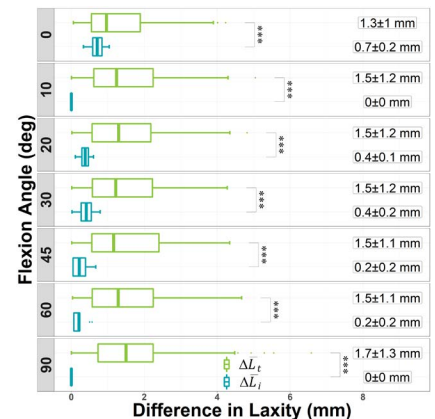
Conclusion

Alignment technique contributes more towards laxity and balance variability than implant design. Implant geometry has no effect on ML balance variability. The laxity variability from alignment technique was similar to the variability measured from the arthritic knee population. Greater consideration should be given to alignment technique than implant geometry when achieving balance in TKA.

7.a Multiple alignment strategies are possible with Corin Robotics - MR vs GB

|	
Title	Predictive Gap-balancing Reduces the Extent of Soft-tissue Adjustment Required After Bony Resection in Robot-assisted Total Knee Arthroplasty - A Comparison With Simulated Measured Resection.
Authors	Orsi AD, Wakelin EA, Plaskos C, Gupta S, Sullivan JA
Publication	Arthroplast Today. 2022 May 20:16:1-8

Methods

Two surgeons performed 95 robot-assisted GB total knee arthroplasties with predictive balancing, limiting tibial varus to 3° and adjusting femoral positioning to optimize balance. A robotic ligament tensioner measured joint laxity. Planned MR (pMR) was simulated by applying neutral tibial and femoral coronal resections and 3° of external femoral rotation. ML balance, laxity, component alignment, and resection depths were compared between planned GB (pGB) and pMR. ML balance and laxity were compared between pGB and final GB (fGB).

Results

The proportion of knees with >2 mm of ML imbalance in flexion or extension ranged from 3% to 18% for pGB vs 50% to 53% for pMR (p < 0.001). Rates of ML imbalance >3 mm ranged from 0% to 9% for pGB and 30% to 38% for MR (p < 0.001). The mean pMR laxity was 1.9 mm tighter medially and 1.1 mm tighter laterally than pGB throughout flexion. The mean fGB laxity was greater than the mean pGB laxity by 0.5 mm medially and 1.2 mm laterally (p < 0.001).

Conclusion

MR led to tighter joints than GB, with ML gap imbalances >3 mm in 30% of knees. GB planning improved ML balance throughout flexion but increased femoral posterior rotation variability and bone resection compared to MR. fGB laxity was likely not clinically significantly different than pGB.
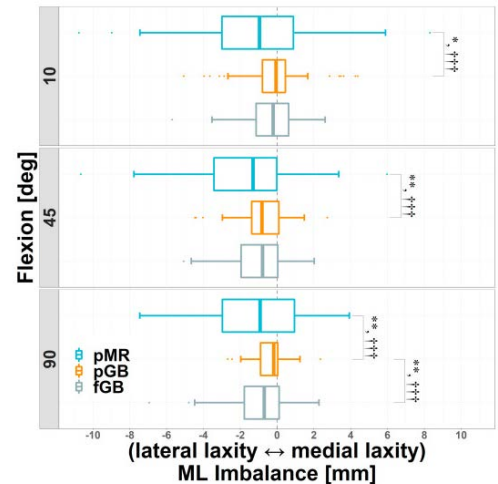
7.b Multiple alignment strategies are possible with Corin Robotics - rKA vs GB

Methods
One surgeon performed 68 rKA, another performed 73 GB TKAs using the same CR implant and robotic system. rKA limited femoral valgus and tibial varus to 6°, with tibial recuts performed to achieve balance. GB limited tibial varus and femoral valgus to 2°, with femoral resections adjusted to achieve mediolateral balance throughout flexion using predictive-gap planning software. Final joint laxity was measured using a robotic ligament tensioner. Statistical analyses were performed to compare differences in mediolateral balance and joint laxity throughout flexion. Further analyses compared alignment, joint line elevation and orientation (JLO), and frequency of ligament releases and bone recuts.

Results
Both techniques reported greater lateral laxity throughout flexion, with GB reporting improved mediolateral balance from 10° to 45° flexion. GB resected 1.7 mm more distal femur (p ≤ 0.001) and had greater overall laxity than rKA throughout flexion (p ≤ 0.01). rKA increased JLO by 2.5° and 3° on the femur and tibia (p ≤ 0.001). Pre-operative and post-operative coronal alignment were similar across both techniques. rKA had a higher tibial recut rate: 26.5% vs 1.4%, p < 0.001.

Conclusion
rKA and GB both report lateral laxity but with different JLO and elevation. Use of a predictive-gap GB workflow resulted in greater mediolateral gap symmetry with fewer recuts.
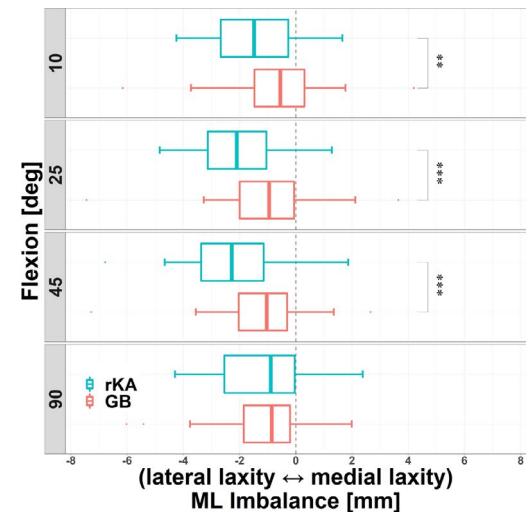
7.c Multiple alignment strategies are possible with Corin Robotics - iKA vs GB

Title	Restricted Inverse Kinematic Alignment Better Restores the Native Joint Line Orientation While Achieving Similar Balance, Laxity, and Arithmetic Hip-Knee-Ankle Angle to Gap Balancing Total Knee Arthroplasty.
Authors	Orsi AD, Wakelin EA, Plaskos C, McMahon S, Coffey S
Publication	Arthroplast Today. 2023 Jan 16:19:101090

Methods
Two surgeons performed 75 robot-assisted iKA total knee arthroplasties. A digital joint tensioner collected laxity data throughout flexion before femoral resection. The femoral component position was determined using predictive gap-planning to optimize the balance throughout flexion. Planned gap balancing (pGB) simulations were performed for each case using neutral tibial resections. Mediolateral balance, laxity, and CPAK were compared among pGB, planned iKA (piKA), and final iKA (fiKA).

Results
Both piKA and pGB had similar mediolateral balance and laxity, with mean differences <0.4 mm. piKA had a lower mean absolute difference from native JLO than pGB (3 ± 2° vs 7 ± 4°, p < 0.001). aHKA was similar (p < 0.05) between pGB and piKA. piKA recreated a more native CPAK distribution, with types I-V being the most common ones, while most pGB knees were of type V, VII, and III. Final iKA and piKA had similar mediolateral balance and laxity, with a root-mean-square error <1.4 mm.
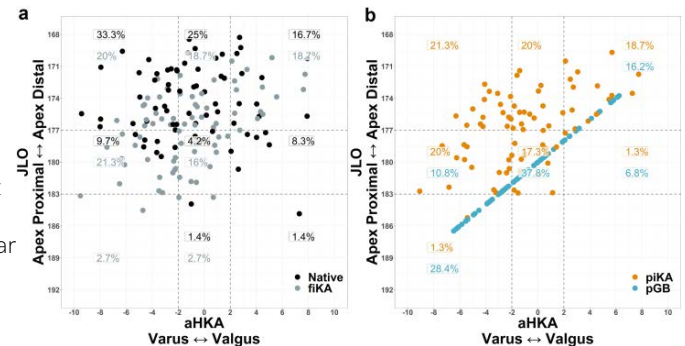
Conclusion
Although balance, laxity, and aHKA were similar between piKA and pGB, piKA better restored native JLO and CPAK phenotypes. The neutral tibial resection moved most pGB knees into types V, VII, and III. Surgeons should appreciate how the alignment strategy affects knee phenotypes.

8. The BalanceBot™ can accurately predict and achieve post-op ligament balance

Title	Imageless, Robotic-Assisted TKA Combined With A Robotic Tensioning System Can Help Predict And Achieve Accurate Post-Operative Ligament Balance.
Authors	Shalhoub S, Lawrence JM, Keggi JM, Randall AL, DeClaire JH, Plaskos C
Publication	Arthroplast Today. 2019 Sep; 5(3): 334–340

Methods

A robotic-assisted ligament tensioning technique was utilised in 121 sequential knees. Predictive gap profiles were used to plan femoral implant position to achieve a balanced knee. Final gap profiles were then compared to the predictive gap plans.

Results

Over 90% of knees were balanced to within 2mm mediolaterally throughout the range of motion. Over 90% of knees were balanced within 1mm from flexion to extension.

Knees balanced within 2mm mediolaterally
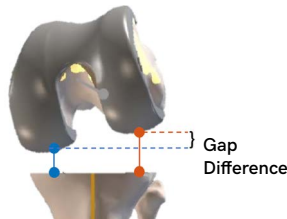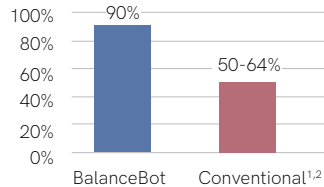
	BalanceBot	Conventional[1,2]
	90%	50-64%

Gap Difference

Knees balanced within 1mm from flexion to extension

	BalanceBot	Conventional[1,2]
	90%	32-50%

Average Gap
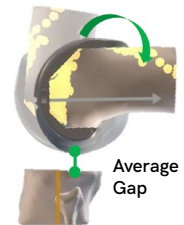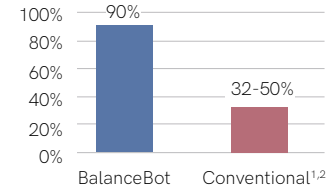
Conclusion

OMNIBotics Predictive Balance Technique could accurately predict and consistently achieve postoperative gap balance. This allows surgeons to virtually plan femoral implant alignment to optimise balance throughout motion. The rate of balance achieved in this study was significantly higher than previous reports using conventional instrumentation[1,2].

1.   Joseph et al, The Knee 20 (2013) 401–406.
2.   Lee et al, Knee Surg Sports Traumatol Arthrosc (2010) 18:381–387.

9. The BalanceBot™ Improves ligament balance compared to standard robotic surgery

Title	Impact of a Digital Balancing Tool on Femur and Tibial First Total Knee Arthroplasty: A Prospective Nonrandomized Controlled Trial.
Authors	Koenig JA, Wakelin EA, Passano B, Shalhoub S, Plaskos C
Publication	Arthroplast Today. 2022 Sep 22:17:172-178

Methods

One-hundred six patients had posterior cruciate ligament sacrificing total knee arthroplasty using a digital joint tensioner. The participants were divided into 4 groups with different visibility to balance data

1) Femur-first blinded data,

2) Femur-first not blinded data,

3) Tibia-first blinded data,

4) Tibia-first not blinded data with predictive balancing.

Results

Group 4 reported less midflexion imbalance (40°) compared to all other groups (1: 1.5 mm, 2: 1.7 mm, 3: 1.6 mm, 4: 1.0 mm, $p < 0.031$) and reduced variance compared to all other groups at 40° and 90° ($p < 0.012$), resulting in an increased frequency of joints balanced within 2 mm throughout flexion in group 4.

Proportion of knees balanced <2 mm

Conclusion

Improvements in balance were observed in midflexion instability and balance variability throughout flexion when a tibia-first approach in combination with a digital balancing tool was used. The combination of a digital balancing tool and a tibia-first approach allowed a target joint balance to be achieved more accurately compared to a non-sensor augmented or femur-first approach.
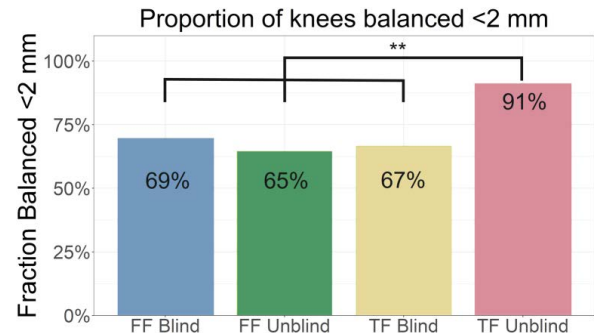
10. The OMNIBot™ improves boney resection accuracy compared to manual surgery

Title	Sequential Versus Automated Cutting Guides In Computer-Assisted Total Knee Arthroplasty.
Authors	Koulalis D, O'Loughlin PF, Plaskos C, Kendoff D, Cross MB, Pearle AD
Publication	Knee. 2011 Dec;18(6):436-42

Methods Bilateral cadaver study comparing the OMNIBot to conventional block navigation in 12 knees.

Results Increased accuracy and precision in robotic group:

- Guide positioning (0.55° vs 1.1° SD varus, p<0.03)
- Bone cuts (mean error: 0.6mm vs 1.4mm, p=0.01)

- Final implant placement (1.0° vs 2.2° SD varus, p=0.11),
- Faster than freehand navigation of multiple blocks.

Guide positioning precision
Automated guide
Conventional blocks
Distal cut — Varus/valgus, Flexion, Cut height
Anterior cut — Rotation, Flexion, Cut height
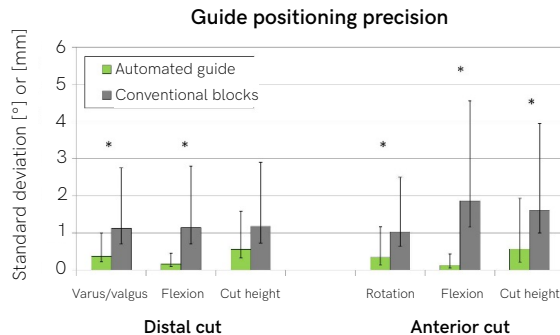
Accuracy of bone cut surfaces
Distance between measured and planned cutting planes (mm)
OMNIBot™
Conventional
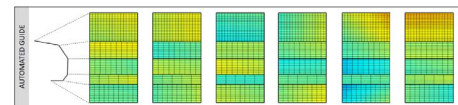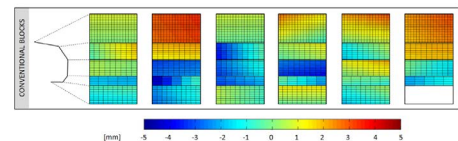
Conclusion Robotic guide positioning resulted in more efficient and more accurate femoral cuts in comparison to conventional cut blocks in a cadaveric model.

11. OMNIBot™ and BalanceBot™ deliver accurate component positioning

Title	Comparison of CT with intra-operative navigation reported implant position utilizing a robotic assisted technique in total knee arthroplasty
Authors	Sharma N, Berera V, Petterwood J
Publication	[Med Eng Phys. 2022 Oct:108:103881](#)

Methods

We evaluated 87 patients (92 knees) undergoing robotic assisted TKA. Position estimated by the navigation software and postoperative CT scan were compared. Post-operative CT scans were interpreted by a senior radiologist blinded to intra-operative component position. Recorded were femoral varus/valgus, tibial varus/valgus and overall limb alignment in the coronal plane. In the sagittal plane tibial slope and femoral flexion/extension. Femoral component rotation was assessed in relation to the transepicondylar axis (TEA).

Results

Mean difference between software estimation and postoperative CT scan of the femoral component position in the coronal plane was 1.02° (0.86–1.18, 95%CI). Tibial coronal position was 1.19° (0.97–1.41). Sagittal plane component position for the femur was 1.64° (1.41–1.87). Tibial slope was 1.44° (1.21–1.68). Mean femoral component rotation was 1.27° (1.01–1.53). Overall 94.57% of intraoperative measures were within 3° of the component position measured on CT.
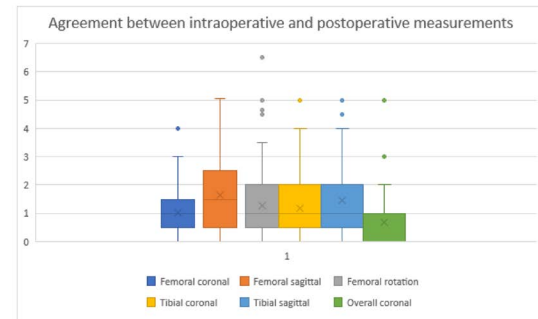
Fig. 1. Box and whisker plot of agreement between intraoperative estimation of component position and postoperative CT measurement.

Conclusion

Robotic assisted navigation used in combination with a novel balancing system can result in very accurate component positioning during total knee arthroplasty.

12.a Excellent clinical and patient reported outcomes with Corin Robotics

Title	Early Clinical Outcomes Of A Novel Predictive Ligament Balancing Technique For Total Knee Arthroplasty.
Authors	Keggi JM, Lawrence JM, Randall AL, DeClaire JH, Ponder CE, Koenig JA, Shalhoub S, Wakelin EA, Plaskos C
Publication	EPiC Series in Health Sciences. Volume 4, 2020, Pages 160–164

Methods
533 patients were prospectively enrolled and underwent robotic-balancing (RB) TKA. Pre. and postop. WOMAC, UCLA, HSS-Patient Satisfaction scores were collected and compared to registry data from the Shared Ortech Aggregated Repository (SOAR), a TJA PROM repository of thousands of TKAs from hospitals, teaching institutions and clinics in the US. Overall satisfaction rates were compared using a weighted average of a range of contemporary literature.

Results
Postoperatively, all outcome scores remained significantly better in the RB cohort compared to registry data at 3M and 6M (p < 0.012). At 1Y, WOMAC remains significantly better than registry data (p < 0.001). Overall patient satisfaction in the robotic cohort was significantly better than recognised rates reported in literature at > 91% at 3M and > 96% at 1Y.

WOMAC total

* p < 0.0001

── SOAR ── BalanceBot

BalanceBot overall patient satisfaction

Data source ▮ BalanceBot ▮ Literature
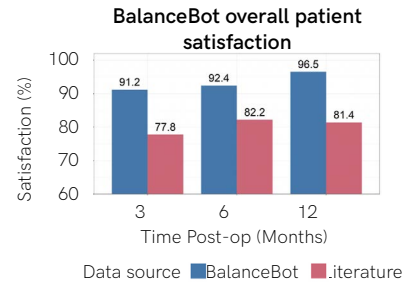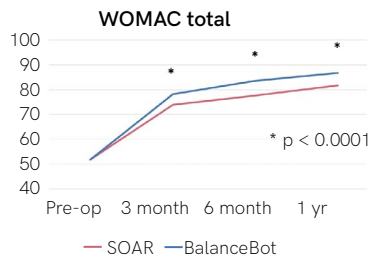
Conclusion
Predictive Balance™ technique with BalanceBot has demonstrated significant improvements to postoperative patient satisfaction rates compared to traditional TKA.

Satisfaction and Survivorship

12.b Excellent clinical and patient reported outcomes with Corin Robotics

Title	Patient Expectations and Satisfaction in Robotic-assisted Total Knee Arthroplasty - A Prospective Two Year Outcome Study.
Authors	Blum CL, Lepkowsky E, Hussein A, Wakelin EA, Plaskos C, Koenig JA
Publication	Arch Orthop Trauma Surg. 2021 Dec;141(12):2155-2164

Methods

106 patients received robotic-assisted TKA with OMNIBotics by a single surgeon and followed for 2 years. KSS expectation fulfillment and satisfaction were compared at 1Y and 2Y post-TKA. KOOS scores were also compared to nationwide US outcomes database, FORCE – TJR.

Results

Patients with greater than average KSS expectation fulfillment at 3M reported significantly higher KSS satisfaction scores at 1Y, and patients with greater than average 6M expectation fulfillment reported improved satisfaction at 1Y and 2Y. When compared to the FORCE-TJR database, significant differences in post-operative KOOS outcomes were observed for Sports and Recreation, for which the RAS group demonstrated higher scores. The robotic cohort also reported significantly greater improvements in KOOS Pain at 6M, 1Y and 2Y, Symptoms at 2Y, ADL at 1Y and 2Y, Sports at 2Y and Quality of Life at 1Y and 2Y. Overall patient dissatisfaction rates were 2.9%, 1.0%, 0.0% and 1.3% at 3, 6, 12, and 24 months postoperatively, respectively.

Table 1 – Change in 2 Year KOOS subscale scores for robotics assisted total knee arthroplasty (RAS -TKA) and FORCE-TJR data from literature.

KOOS Subscore	Study (n=106)	FORCE-TJR (Lyman 2016) N=2291	Mann-Whitney-U test p-value
Pain	46.3±15.0	38.2	$p < 0.001$
Symptoms	40.3±15.7	32.1	$p < 0.001$
ADL's	42.9±15.4	31.1	$p < 0.001$
Sports & Rec	45.2±27.2	33.9	$p < 0.001$
QOL	57.2±18.9	42.8	$p < 0.001$

Months (M) Years (Y), Knee Injury and Osteoarthritis Outcome Score (KOOS)

Conclusion

High early expectation fulfillment was associated with improved satisfaction at 1Y and 2Y, indicating the importance of managing patient specific postoperative care to ensure patients reach their preoperative goals. Greater improvements in all KOOS subscores were observed in this robotics assisted cohort compared to a large contemporary database.

Satisfaction and Survivorship

13. 99.5% Survivorship at 6 years

Methods

Materials and methods A literature review was conducted using the PRISMA guidelines. Thirteen papers were included for the final review.

Results

The OMNIBot is an accurate and consistent delivery tool in TKA surgery and compares favourably to instrumented, navigation-assisted and patient-specific cutting guides. The OMNIBot has been shown to be a reliable tool for delivering different alignment philosophies as well as planning and achieving tibio-femoral coronal balancing. The utility of the system is increased when the robot is used in conjunction with a soft-tissue tensioning device—the BalanceBot. Survival analysis of RATKA using the OMNIBot is limited to one study which reported 99.26% survivorship at 3 years. We report our own outcomes using the OMNIBot, having performed 766 TKA's using the OMNIBot, since 2014 with 99.48% survivorship at 6 year follow-up.

Conclusion

The OMNIBot platform is an imageless, passive robotic system available since 2007, with over 30,000 TKA's being performed with its assistance. It has a small physical footprint, is relatively inexpensive and time efficient. Our review demonstrates a high level of precision of the surgical planning, with a modestly improved accuracy compared to conventional and navigation technology.

Number at Risk	0 Yr	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs	6 Yrs	7 Yrs
Surgeon 1447	766	642	524	365	208	102	47	7
Other Surgeons	5174	3834	2560	1497	802	389	192	76
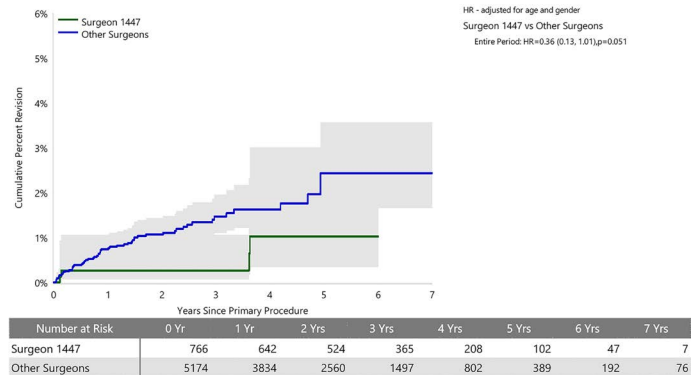
14. Increased ROI for healthcare system with improved QALY and reduced revision rate

Title	What is the Value of a Balanced Total Knee Arthroplasty? Getting It Right the First Time.
Authors	Lee GC, Smith GH, Wakelin EA, Garino JP, Plaskos C
Publication	J Arthroplasty. 2023 Jun;38(6S):S177-S182

Methods

A Markov model was developed to determine the value from reduced revisions and improved outcomes associated with TKA joint balance. Patients were modeled for the first 5 years following TKA. The threshold to determine cost-effectiveness was set at an incremental cost effectiveness ratio of $50,000/quality-adjusted life year (QALY). A sensitivity analysis was performed to evaluate the influence of QALY improvement (ΔQALY) and Revision Rate Reduction on additional value generated compared to a conventional TKA cohort.

Results

The total value of a balanced knee for the first 5 years was $8,750, $6,575, and $4,417 per case, for low, medium, and high-volume surgeons, respectively. Change in QALY accounted for greater than 90% of the value gain with a reduction in revisions making up the rest in all scenarios. The economic contribution of revision reduction was relatively constant regardless of surgeon volume ($500/case).

Total Value of a Balanced Knee
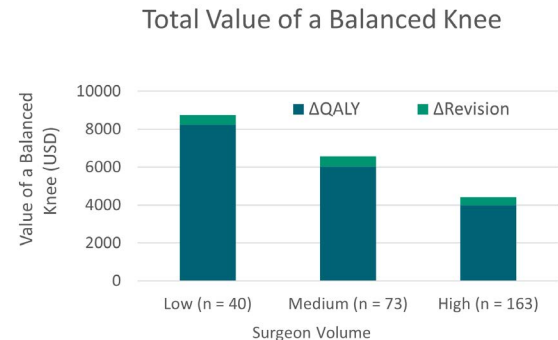
Conclusion

Achieving a balanced knee had the greatest impact on ΔQALY over early revision rate. These results can help assign value to enabling technologies with joint balancing capabilities.

15. Cost saving of $2085 with Corin Robotics in a bundled episode of care setting

Title	Total Knee Arthroplasty Technique: OMNIBotics®.
Authors	Koenig JA, Plaskos C
Publication	In Robotics in Knee and Hip Arthroplasty: Current Concepts, Techniques and Emerging Uses. Ed. Lonner JH. Springer 2019

Methods   Overall procedural costs and clinical outcomes over the 90-day episode of care period were compared for patients undergoing TKA with either robotic-assisted (RAS, 3 surgeons, 147 patients) or conventional (Conv., 3 surgeons, 85 patients) instrumentation at single institution participating in the CMS Bundled Payment for Care Improvement (BPCI) model.

Results   RAS and Conv-TKA procedures exhibited an average gain per episode of $7,600 and $5,579, respectively. The average total cost per episode was $2,085 lower for patients receiving RAS-TKA ($28,943 versus $31,028), with the majority of cost savings in reduced skilled nursing facility (SNF) usage ($1,481) and readmissions ($944). Discharge to home versus Sub-acute Rehabilitation Facilities (SAR's) was 14% higher in the RAS group (62% vs 48%, p<0.05).

Conclusion   Implementation of a standardized care pathway resulted in a reduction in overall episode of care costs, with further reductions in cost and discharge to SARs observed with the use of RAS.

90 day cost breakdown

	Robotic	Conventional
Total	$28,943	$31,028

Legend:
- Anchor inpatient stay
- SNF
- IRF
- Home health
- Readmissions
- Outpatient physical therapy
- Outpatient/professional
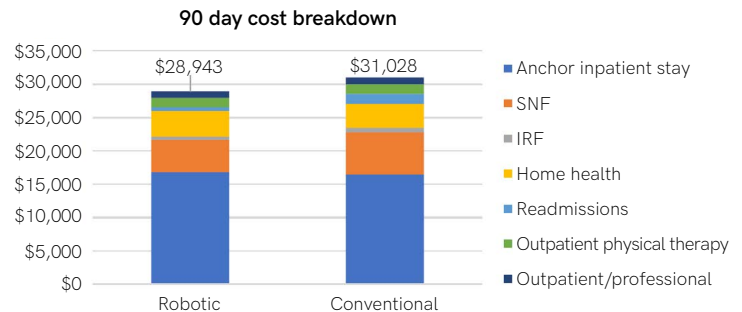
16. Increased ROI for hospitals, with reduced manipulation rates and higher procedural volume

Title	OMNIBotics® BalanceBot™ case study.*
Authors	Plaskos C, Gill PS, Lawrence JM
Publication	DOCSF - Digital Orthopaedics Conference, San Francisco, 2019

Methods — A case study for a rural hospital that recently adopted OMNIBotics is presented. Clinical outcomes studied included TKA readmit rates for postop. Manipulations Under Anesthesia (MUA). Economic outcomes included increase in procedure volume and associated revenue, and potential cost savings over a competitive, capital-cost robotic system.

Results — Postop. MUA rates reduced from 6.1% to 2.4% after introduction of the BalanceBot. TKA procedure volumes increased by 24% over two years, representing a potential $1.5M increase in revenues[1]. Cost analysis indicated a $780 cost savings per surgery over a competitive robotic system.

Conclusion — Introduction of a robotic ligament balancing TKA system resulted in a reduction in MUA readmissions and an increase in TKA procedure volumes and associated potential revenue at one rural hospital.

Manipulation under anesthesia rates

Pre-BalanceBot 6.10% (2016); Post-BalanceBot 2.40% (2018)

Hospital TKA procedure volume
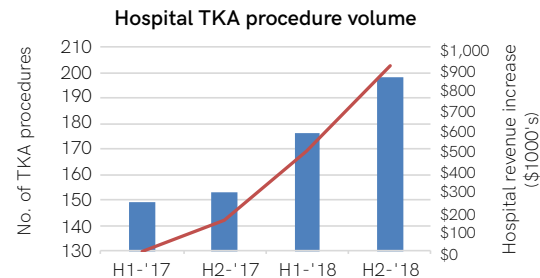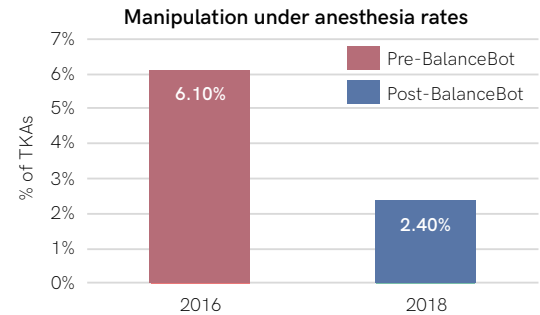
1. Based on average total reimbursement of $14,8k (Institution specific CMS/medicare reimbursement data for In-patient DRG-470) OMNIBotics platform introduced in hospital in Dec 2016.

17. Short learning curve and high patient satisfaction during learning phase

*1st Place winner of 2016 Transatlantic Orthopaedic Congress Award of Excellence for an Oral Scientific Poster: Knee

Title	Learning Curve And Early Patient Satisfaction Of Robotic-Assisted TKA.
Authors	Keggi JM, Plaskos C
Publication	ICJR Transatlantic Orthopaedic Conference, 2016

Methods

The first 29 robotic-assisted TKA cases performed by a single surgeon having no prior experience with computer or robotic-assisted TKA were reviewed for procedure times and and satisfaction.

Results

All time metrics decreased significantly after the first 7 cases, except the residual time. Mean skin-to-skin time significantly decreased from 83.7min to 57.1min (p=0.0008) beyond 7 cases. 85.7% (24/29) of patients were "Fully satisfied" and 14.3% (5/29) were "Partly satisfied". No patients were "Not Satisfied".

Conclusion

Improvements in surgical efficiency and quality are becoming increasing important in today's healthcare environment. The results of this study indicated equal cost, a short learning curve and comparable procedure times to conventional TKA. The PROMs with this group of patients was very high compared to rates reported in the literature.

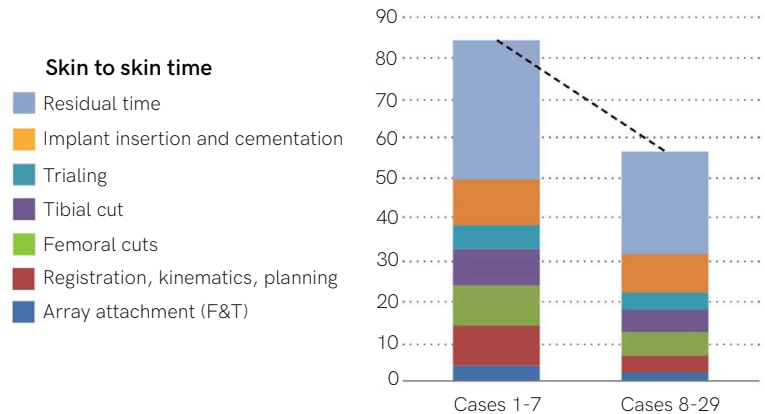**Skin to skin time**

- Residual time
- Implant insertion and cementation
- Trialing
- Tibial cut
- Femoral cuts
- Registration, kinematics, planning
- Array attachment (F&T)

Fig 1. Skin to skin time decreased from 84min to 57min (p=0.0008) after 7 cases.

Ease of Use

18. Minimal operative and storage footprint

Title	A Comparison of Robotic-Assisted Systems' Footprint in the OR
Authors	Corin Internal Study
Publication	Data on file at Corin Group LTD (NL-011)

Methods

This analysis compares the OMNIBotics overall operating room 2D footprint, sterile field 2D footprint and surgical access 2D footprint to the Stryker MAKO and Depuy Synthes VELYS Robotic-assisted TKA systems. The 2D footprint is defined as the sum of the projection of each component in the worst-case scenario clinically relevant position.

- The Overall Operating Room footprint includes all robotic components and stations used in the procedure
- The Sterile Field footprint includes all robotic components and stations used within the sterile field
- The Surgical Access footprint includes all robotic components in direct contact with the patient.

For the OMNIBotics station, only one robotic component would be in contact with the patient at a time. As a worst-case, the OMNIBot (being the larger of the two) is used for this measurement

Results

Company (Robotic System)	Surgical Access Footprint (in²)	Sterile Field Footprint (in²)	Overall OR Footprint (in²)
Stryker (MAKO)[3]	1715	1715	4064
Depuy (VELYS)[4]	336	1165 (w/ satellite station) 436 (w/o satellite station)	1816
Corin (OMNIBotics)	54.3	71.5	395.5

Robotic System	Surgical Access Footprint (in²)	Sterile Field Footprint (in²)	Overall OR Footprint (in²)
MAKO	97%	96%	90%
VELYS	84%	94% (w/ satellite station) 84% (w/o satellite station)	78%

Conclusion

The OMNIBotics systems consists of compact, handheld robotic components and is substantially smaller than major competitive systems, Stryker MAKO and Depuy Synthes VELYS. The compactness of the system is expected to reduce OR ine_ciencies and its portability will allow the OR sta_ to transfer it from OR to OR and potentially maximize utilization.

Corin Robotics Reference Papers

Background references
- Blue Cross Blue Shield, The Health of America Report. Planned Knee and Hip Replacement Surgeries are on the Rise in the U.S. Published January 23, 2019
- Data on File at Corin Group LTD (NL-011)

Outcomes
- Wakelin EA, Ponder CE, Randall AL, Koenig JA, Plaskos C, DeClaire JH, Lawrence JM, Keggi JM. Intra-operative laxity and balance impact 2-year pain outcomes in TKA: a prospective cohort study. Knee Surg Sports Traumatol Arthrosc. 2023 Oct 14. doi: 10.1007/s00167-023 07601-x.
- Wakelin EA, Shalhoub S, Lawrence JM, Keggi JM, DeClaire JH, Randall AL, Ponder CE, Koenig JA, Lyman S, Plaskos C. Improved total knee arthroplasty pain outcome when joint gap targets are achieved throughout flexion. Knee Surg Sports Traumatol Arthrosc. 2022 Mar;30(3):939-947. doi: 10.1007/s00167-021-06482-2
- Vigdorchik JM, Wakelin EA, Koenig JA, Ponder CE, Plaskos C, DeClaire JH, et al Keggi JM. Impact of Component Alignment and Soft Tissue Release on 2-Year Outcomes in Total Knee Arthroplasty. J Arthroplasty, 37(10), 2035-2040. 2022.
- Lee GC, Wakelin EA, Randal AL, Plaskos C. Can a robot help a surgeon predict a good total knee arthroplasty? Bone Joint J 2021; 103-B(6 Supple A):67–73
- Keggi JM, Wakelin EA, Koenig JA, Lawrence JM, Randall AL, Ponder CE, DeClaire JH, Shalhoub S, Lyman S, Plaskos C. Impact of Intra-Operative Predictive Ligament Balance on Post-operative Balance and Patient Outcome in TKA: A Prospective Multicenter Study. Arch Orthop Trauma Surg 2021 Dec;141(12):2165-2174. doi: 10.1007/s00402-021-04043-3. Epub 2021 Jul 13.
- Shatrov J, Murphy GT, Duong J, Fritsch B. Robotic-assisted total knee arthroplasty with the OMNIBot platform: a review of the principles of use and outcomes. Arch Orthop Trauma Surg. 2021 Dec;141(12):2087-2096. doi: 10.1007/s00402-021-04173-8. Epub 2021 Oct 15.
- Hernández-Vaquero D et al. The Use of PS or CR Models is not Sufficient to Explain the Differences in the Results of Total Knee Arthroplasty. Study of Interactions. British Journal of Medicine and Medical Research, 2016, 12(8):1-9.
- Martín-Hernández C. et al. Navigated versus conventional total knee arthroplasty: A prospective study at three years follow-up. Rev Esp Cir Ortop Traumatol. 2018 Mar 28.
- Martín-Hernández C. et al. Does the medial-lateral stability of total knee replacements have an effect on short-term clinical outcomes? One-year results of a multicentre study with computer assisted surgery. Rev Esp Cir Ortop Traumatol. 2014 Mar-Apr;58(2):101-7.

Accuracy and efficiency
- Shalhoub S, Lawrence JM, Keggi JM, Randall AL, DeClaire JH, Plaskos C. Imageless, robotic-assisted TKA combined with a robotic tensioning system can help predict and achieve accurate post-operative ligament balance Arthroplasty Today 5 (2019) 334-330
- Shalhoub S, Moschetti WE, Dabuzhsky L, Jevsevar DS, Keggi JM, Plaskos C. Laxity Profiles in the Native and Replaced Knee-Application to Robotic-Assisted Gap-Balancing Total Knee Arthroplasty. J Arthroplasty. 2018 Sep;33(9):3043-3048.
- Figueroa F, Wakelin E, Twiggs J, Fritsch B. Comparison between navigated reported position and postoperative computed tomography to evaluate accuracy in a robotic navigation system in total knee arthroplasty. Knee. 2019 Aug;26(4):869-875
- Clark TC, Schmidt FH. Robot-assisted navigation versus computer-assisted navigation in primary total knee arthroplasty: efficiency and accuracy. ISRN Orthop. 2013:794827.

- Nam D, Maher PA, Rebolledo BJ, Nawabi DH, McLawhorn AS, Pearle AD. Patient specific cutting guides versus an imageless, computer-assisted surgery system in total knee arthroplasty. Knee. 2013 Aug;20(4):263-7.
- Koulalis D, O'Loughlin PF, Plaskos C, Kendoff D, Cross MB, Pearle AD. Sequential versus automated cutting guides in computer-assisted total knee arthroplasty. Knee. 2011;18(6):436-442.
- Koulalis D, O'Loughlin PF, Plaskos C, Kendoff D, Pearle AD. Adjustable cutting blocks for computer-navigated total knee arthroplasty - A cadaver study. J Arthroplasty. 2010 Aug;25(5):807-11.
- Suero EM, Plaskos C, Dixon PL, Pearle AD. Adjustable cutting blocks improve alignment and surgical time in computer-assisted total knee replacement. Knee Surg Sports Traumatol Arthrosc. 2012 Sep;20(9):1736-41.
- Perrin N, Stindel E, Roux C. BoneMorphing versus freehand localization of anatomical landmarks: consequences for the reproducibility of implant positioning in total knee arthroplasty. Comput Aided Surg. 2005 Sep-Nov;10(5-6):301-9.
- Koenig JA, Wakelin EA, Passano B, Shalhoub S, & Plaskos C (2022). Impact of a Digital Balancing Tool on Femur and Tibial First Total Knee Arthroplasty: A Prospective Nonrandomized Controlled Trial. Arthroplasty Today, 17(1), 172-178.
- Sharma AK, Plaskos C, Shalhoub S, Lawrence, D., Vigdorchik JM, Lawrence JM (2023). Ligament Tension and Balance before and after Robotic-Assisted Total Knee Arthroplasty - Dynamic Changes with Increasing Applied Force. J Knee Surg. doi:10.1055/s-0042-1760390

Alignment and Balance
- Edelstein AI, Wakelin EA, Plaskos C, Suleiman LI. Laxity, Balance, and Alignment of a Simulated Kinematic Alignment Total Knee Arthroplasty. Arthroplast Today. 2023 Sep 18;23:101204. doi: 10.1016/j.artd.2023.101204. eCollection 2023 Oct.
- Orsi AD, Wakelin EA, Plaskos C, Gupta, S., & Sullivan JA (2022). Predictive Gap-balancing Reduces the Extent of Soft-tissue Adjustment Required After Bony Resection in Robot-assisted Total Knee Arthroplasty-A Comparison With Simulated Measured Resection. Arthroplast Today, 16, 1-8. doi:10.1016/j.artd.2022.03.025
- Orsi AD, Wakelin EA, Plaskos C, McMahon S, & Coffey S. (2023). Restricted Inverse Kinematic Alignment Better Restores the Native Joint Line Orientation While Achieving Similar Balance, Laxity, and Arithmetic Hip-Knee-Ankle Angle to Gap Balancing Total Knee Arthroplasty. Arthroplast Today, 19, 101090. doi:10.1016/j.artd.2022.101090
- Orsi AD, Wakelin EA, Plaskos C, Petterwood J, & Coffey S (2022). Restricted kinematic alignment achieves similar relative lateral laxity and greater joint line obliquity compared to gap balancing TKA. Knee Surgery, Sports Traumatology, Arthroscopy, 1-9.
- Kim R, Wakelin EA, Plaskos C, Gupta S, & Putman S (2022). Variation in knee balance as a function of hip-knee-ankle angle and joint line obliquity in robotic assisted total knee arthroplasty. Int Orthop. doi:10.1007/s00264-022-05636-2
- Lee GC, Wakelin EA, & Plaskos C (2022). What Is the Alignment and Balance of a Total Knee Arthroplasty Performed Using a Calipered Kinematic Alignment Technique? J Arthroplasty, 37(6s), S176-s181. doi:10.1016/j.arth.2022.01.065

Economics
- Koenig JA, Plaskos C. Total Knee Arthroplasty Technique: OMNIBotics. In Robotics in Knee and Hip Arthroplasty: Current Concepts, Techniques and Emerging Uses. Ed. Lonner JH. Springer 2019
- Lee GC, Smith GH, Wakelin EA, Garino JP, & Plaskos C (2023). What is the Value of a Balanced Total Knee Arthroplasty? Getting it Right the First Time. J Arthroplasty. doi:10.1016/j.arth.2023.03.022

Technical

- Shalhoub S, Plaskos C, Todorov A, Lawrence JM, Keggi JM. Development of an Active Soft Tissue Balancing System for Robotic-Assisted Total Knee Arthroplasty. In Handbook of Robotic and Image-Guided Surgery. Ed. Mohammad H. Abedin-Nasab. Elsevier. Chapter 27, pages 459-473, 2019
- Suero EM, Citak M, Claps C, Pearle AD, Plaskos C. Variations in ankle registration using two different anatomic landmarks: a radiographic study. Knee Surg Sports Traumatol Arthrosc. 2013 Dec;21(12):2759-63.
- Hodgson AJ, Plaskos C. Robotics in orthopedic surgery: proven versus predicted benefits of commercially available systems. In Robotic Surgery: Applications and Advances, Eds. D Kendoff, AD Pearle. Future Medicine Ltd. March 2013, Pages 134-149
- Plaskos C, Koenig JA, Ponder CE. Robotic-assisted knee replacement surgery. In Medical Robotics: Minimally Invasive Surgery. Edited by P. Gomes. Woodhead Publishing Ltd, Cambridge, UK, 2012 pp 113-158

Conference proceedings

2023

- Ponder CE, Slotkin E, Keggi JM, Lawrence JM, McMahon S, Coffey S, Wakelin EA, Plaskos C, Orsi AD Smartphone-Based Step-Count Measures Correlate with H/KOOS12-Function and UCLA Activity PROMs During Early THA and TKA Recovery, ISTA 2023
- Ponder CE, Slotkin E, Keggi JM, Lawrence JM, McMahon S, Coffey S, Wakelin EA, Plaskos C, Orsi AD Preoperative Medial Laxity Correlates with Poorer and Postoperative Lateral Laxity Correlates with Improved PROMs Scores, ISTA 2023
- Lee GC, Wakelin EA, Plaskos C Alignment in Total Knee Arthroplasty is Only Part of the Equation: High Variability of Ligament Laxities for Each Knee Alignment Category, ISTA 2023
- Forlenza E, Orsi AD, Plaskos C, Kreuzer S, Slotkin E, Karas V Midflexion Laxity in TKA: Alignment Matters, Implant Choice Does Not, ISTA 2023
- Wakelin EA, Edelstein A, Suleiman L, Plaskos C Impact of PCL resection on Coronal and Sagittal Joint Balance in TKA, ISTA 2023
- Edelstein A, Suleiman L, Orsi AD, Plaskos C, Coffey S. Can Imageless Navigation Accurately Determine CPAK in Total Knee Arthroplasty?, ISTA 2023
- Wakelin EA, Lawrence JM, Koenig JA, DeClaire JH, Randall AL, Plaskos C, Ponder CE, Keggi JM Optimizing Intra-operative Laxity and Balance for Improved 2 Year Pain Outcomes in TKA: A Prospective Cohort Study, ISTA 2023
- Orsi AD, Plaskos C, Kreuzer S Kinematic Alignment Best Restores the Patellofemoral Joint and Coronal Plane Alignment of the Knee: A Simulation Study Comparing Several Alignment Techniques, ISTA 2023
- Petterwood J, Sullivan J, Coffey S, McMahon S, Wakelin EA, Plaskos C, Orsi AD Preoperative Medial Laxity in Midflexion and Flexion Correlates with Poorer KOOS-12 Function Scores Prior to TKA, ISAKOS 2023
- Ponder CE, Slotkin E, Coffey S, McMahon S, Wakelin EA, Plaskos C, Orsi AD, Lawrence JM, Keggi JM Smartphone-Based Step-Count Measures Correlate with KOOS-12 Function and UCLA Activity PROMs During Early TKA Recovery, ISAKOS 2023
- Wakelin EA, Lawrence JM, Keggi JM, Randall AL, DeClaire JH, Koenig JA, Ponder CE, Plaskos C, Karas V When Is A Loose Tka A Good Tka?, ISAKOS 2023
- Lee GC, Wakelin EA, Plaskos C. What Is The Value Of A Balanced TKA? Getting It Right The First Time, ISAKOS 2023
- Forlenza E, Orsi AD, Plaskos C, Kreuzer S, Slotkin E, Karas V. Implant Design vs Alignment Technique – What's important when balancing a TKA?, ISAKOS 2023

- Orsi AD, Wakelin EA, Plaskos C, McMahon S, Coffey S. Inverse Kinematic Alignment Better Restores the Native Joint Line while Achieving Similar Laxity to Gap Balancing TKA, ISAKOS 2023
- Luyckx T, Wakelin EA, Plaskos C. Impact Of Tibial Varus On Femoral Component Alignment In Ligament Balancing Total Knee Arthroplasty, ISAKOS 2023
- Putman S, Wakelin EA, Plaskos C. Variation In Pre-Operative Knee Balance As A Function Of Hip-Knee-Ankle Angle And Joint Line Obliquity In Total Knee Arthroplasty, ISAKOS 2023
- Wakelin EA, Lawrence JM, Koenig JA, DeClaire JH, Randall AL, Plaskos C, Ponder CE, Keggi JM Impact of Soft Tissue Balance on 2-year Outcomes in TKA, ISAKOS 2023
- Orsi AD, Slotkin E, Ponder CE, Wakelin EA, Plaskos C, McMahon S, Keggi JM, Lawrence JM. Smartphone Based Step-count Measures Correlate with HOOS12 Function and UCLA Activity PROMs During Early THA Recovery, AAOS 2023
- Randall AL, Wakelin EA, Kah J, Keggi JM, Koenig JA, DeClaire JH, Ponder CE, Lawrence JM, Plaskos C. Impact of laxity and balance on KOOS pain outcomes of a posterior stabilized TKA, AAOS 2023
- Wakelin EA, Lawrence JM, Koenig JA, DeClaire JH, Randall AL, Plaskos C, Ponder CE, Keggi JM. Impact of soft tissue balance and alignment on 2-year outcomes in TKA, AAOS 2023
- Ponder CE, Wakelin EA, Randall AL, Koenig JA, Plaskos C, Jan DeClaire, Lawrence JM, Keggi JM. Optimum Laxity and Balance Using a Random Search Algorithm for Improved 2 Year Pain in TKA, AAHKS 2023

2022
- DeClaire JH, Lawrence JM, Wakelin EA, Plaskos C, Keggi JM, Koenig JA, Ponder CE. Impact of soft-tissue release and component alignment on outcome in robotic-assisted TKA, MOS 2022
- Wakelin EA, Lawrence JM, Sam Mills, Patrick Brimson, Koenig JA, DeClaire JH, Randall AL, Plaskos C, Ponder CE, Keggi JM. Impact of soft tissue balance and alignment on 2-year outcomes in TKA, MOS 2022
- Lee GC, Wakelin EA, Plaskos C. What is the Value of a Balanced TKA?, Knee Society 2022
- Putman S, Wakelin EA, Plaskos C Variation in Pre-operative Knee Balance as a Function of Hip-Knee-Ankle Angle and Joint Line Obliquity in Total Knee Arthroplasty, ESSKA 2022
- Luyckx T. Why Choose the BalanceBot, EKS 2022
- Wakelin EA, Karas V, Lawrence JM, Keggi JM, Randall AL, DeClaire JH, Koenig JA, Ponder CE, Plaskos C. When is a loose TKA a good TKA?, EKS 2022
- Orsi AD, Wakelin EA, Plaskos C, McMahon S, Coffey S. Inverse Kinematic Alignment Better Restores the Native Joint Line while Achieving Similar Laxity to Gap Balancing TKA, EKS 2022
- Luyckx T, Wakelin EA, Plaskos C. Impact of tibial varus on femoral component alignment in ligament balancing Total Knee Arthroplasty, EKS 2022
- DeClaire JH, Wakelin EA, Plaskos C. Impact of Robotics on Early Complications in Total Knee Arthroplasty, EKS 2022
- DeClaire JH, Wakelin EA, Lawrence JM, Koenig JA, Randall AL, Plaskos C, Ponder CE, Keggi JM. Impact of soft tissue balance and alignment on 2-year outcomes in TKA, EKS 2022
- Sharma AK, Plaskos C, Shalhoub S, Lawrence D, Vigdorchik J, Lawrence JM. Non-linear Dynamic Behavior of Ligaments Balanced Under Tension in Robotic-Assisted Total Knee Arthroplasty, CCJR 2022

- Koenig JA, Wakelin EA, Plaskos C. Accuracy of Balance in Tibia and Femur First Total Knee Arthroplasty using Digital Balancing Tools: A Prospective Non Randomized Controlled Trial, CAOS 2022
- Wakelin EA, Lawrence JM, Koenig JA, Ponder CE, Keggi JM and Plaskos C. Impact Of Soft-Tissue Release And Component Alignment On Outcome In Robotic-Assisted TKA, CAOS 2022
- Putman S, Wakelin EA, Plaskos C. Variation In Pre-Operative Knee Balance as a Function of Hip-Knee-Ankle Angle and Joint Line Obliquity in Total Knee Arthroplasty, CAOS 2022
- Wakelin EA, Lawrence JM, Mills S, Brimson P, Koenig JA, DeClaire JH, Randall AL, Plaskos C, Ponder CE, Keggi JM. Patient Specific Soft Tissue Balance Targets in Total Knee Arthroplasty, CAOS 2022
- Orsi AD, Wakelin EA, Plaskos C, McMahon S, Coffey S. Inverse Kinematic TKA Achieves Similar Balance Profiles and More Closely Restores Native Joint Line Obliquity Compared to Simulated Gap Balancing, CAOS 2022
- Orsi AD, Wakelin EA, Plaskos C, Gupta S, Sullivan J. Predictive Gap-Balancing Reduces The Extent Of Soft Tissue Adjustment Required After Bony Resection In Robotic-Assisted Tka - A Comparison With Simulated Measured Resection, CAOS 2022
- Wakelin EA, Lawrence JM, Koenig JA, DeClaire JH, Randall AL, Plaskos C, Ponder CE, Keggi JM. Impact of soft tissue balance on 2 year outcomes in TKA, CAOS 2022
- McMahon S, Orsi AD, Wakelin EA, Plaskos C. The impact of patient demographics on early TKA recovery profiles and daily step count as captured by a smartphone, ASA 2022
- McMahon S, Coffey S, Orsi AD, Wakelin EA, Plaskos C. Inverse Kinematic Alignment Better Restores the Native Joint Line and Achieves Similar Laxity compared to Gap Balancing TKA, ASA 2022
- Coffey S, McMahon S, Sullivan J, Petterwood J, Ponder CE, Slotkin E, Wakelin EA, Orsi AD, Plaskos C. Smartphone-based step count measures correlate with KOOS-12 function and UCLA activity PROMS during early TKA recovery, AOA 2022
- Petterwood J, Coffey S, McMahon S, Ponder CE, Slotkin E, Keggi JM, Lawrence JM, Gill P, Orsi AD, Wakelin EA, Plaskos C. Preop Medial Midflexion Laxity Correlates with Poorer KOOS-12 Function Prior to TKA, AOA 2022
- Coffey S, McMahon S, Orsi AD, Wakelin EA, Plaskos C. Preop Medial Midflexion Laxity Correlates with Poorer KOOS-12 Function Prior to TKA, AOA 2022
- Gupta S, Brooks J, Wakelin EA, Plaskos C, Putman S. Variation in Pre-operative Knee Balance as a Function of Hip-Knee-Ankle Angle and Joint Line Obliquity in Total Knee Arthroplasty, AOA 2022
- Lee GC, Wakelin EA, Plaskos C. Alignment in Total Knee Arthroplasty is Only Part of the Equation: High Variability of Ligament Laxities for Each Knee Alignment Category , AAOS 2022
- Karas V, Wakelin EA, Lawrence JM, Keggi JM, Randall AL, DeClaire JH, Koenig JA, Ponder CE, Plaskos C. When is a loose TKA a good TKA?, AAHKS 2022
- Lee GC, Wakelin EA, Smith G, Plaskos C. What is the Value of a Balanced TKA?, AAHKS 2022
- Randall AL, Wakelin EA, Kah J, Keggi JM, Koenig JA, DeClaire JH, Ponder CE, Lawrence JM, Plaskos C. Impact of Laxity and Balance on Early KOOS Pain Outcomes of a Posterior Stabilized TKA, AAHKS 2022

2021

- Lee GC, Wakelin EA, Plaskos C. What is the Science Behind the Kinematically Aligned TKA?, World Arthroplasty Conference 2021
- Putman S, Wakelin EA, Plaskos C. Incidence of Difficult Anatomic and Soft Tissue Balance Characteristics in the TKA Population, SOFCOT 2021
- Lee GC, Wakelin EA, Plaskos C. What is the Science Behind the Kinematically Aligned TKA?, Knee Society 2021
- Lawrence JM, Keggi JM, Randall AL, Ponder CE, DeClaire JH, Koenig JA, Shalhoub S, Wakelin EA, Plaskos C. One Year Clinical Outcomes of a Novel Predictive Ligament Balancing Technique for TKA, ESSKA 2021
- Wakelin EA, Shalhoub S, Lawrence JM, Keggi JM, Koenig JA, Ponder CE, Randall AL, DeClaire JH, Plaskos C. Intra-operative Soft-tissue Targets in Total Knee Arthroplasty, ESSKA 2021
- Petterwood J, Coffey S. Robotic Ligament Tensioner Confirms Target Balance and Alignment Achieved in KA and GB TKR, ASA 2021
- Sharma N, Berera V, Petterwood J. CT Validation of navigation reported implant position utilising robotic assisted TKR, AOA 2021
- Koenig JA, Wakelin EA, Shalhoub S, Plaskos C. Accuracy of Balance in Tibia and Femur First Total Knee Arthroplasty using Digital Balancing Tools, AAOS 2021
- Ponder CE, Wakelin EA, Lawrence JM, Keggi JM, Koenig JA, Plaskos C. Impact of soft-tissue release and component alignment on outcome in robotic-assisted TKA, AAHKS 2021

2020

- Koenig JA, Wakelin EA, Shalhoub S, Plaskos C. Accuracy of Balance in Tibia and Femur First Total Knee Arthroplasty using Digital Balancing Tools. AAHKS. 2020
- Wakelin EA, Shalhoub S, Lawrence JM, Keggi JM, Randall AL, Ponder CE, DeClaire JH, Koenig JA, Plaskos C. Joint Balance Throughout Flexion Has Greater Impact on 1 Year Pain Outcome than Component Alignment in TKA. AAHKS 2020
- Wakelin EA, Shalhoub S, Lawrence JM, Keggi JM, Randall AL, Ponder CE, DeClaire JH, Koenig JA, Plaskos C. The Effect of Coronal and Axial Femoral Component Rotation on Midflexion Laxity and Patient Reported Outcomes in Total Knee Arthroplasty. ORS, 2020
- Wakelin EA, Shalhoub S, Lawrence JM, Keggi JM, Randall AL, Ponder CE, DeClaire JH, Koenig JA, Plaskos C. Intra-operative Soft Tissue Targets in Total Knee Arthroplasty. ORS 2020
- Keggi JM, Koenig JA, Ponder CE, DeClaire JH, Randall AL, Lawrence JM, Shalhoub S, Wakelin EA, Plaskos C. Accuracy of Balance and Early Outcomes in Tibia and Femur First Total Knee Arthroplasty using a Digital Balancing Tool. AAOS 2020
- Coffey S, Orsi AD, Wakelin EA, Plaskos C. Influence of Alignment Strategy on Ligament Laxity Profiles in TKA: A Simulation Study Using In-vivo Ligament Gap Data. ASA 2020
- Wakelin EA, Shalhoub S, Lawrence JM, Keggi JM, Randall AL, Ponder CE, DeClaire JH, Koenig JA, Plaskos C. Femoral Component Alignment Boundaries for Tibia First Gap Balancing Using Digital Tensioning Tool. CAOS 2020
- Wakelin EA, Shalhoub S, Lawrence JM, Keggi JM, Randall AL, Ponder CE, DeClaire JH, Koenig JA, Plaskos C. Intra-operative Soft Tissue Targets for Improved Outcomes in Total Knee Arthroplasty. CAOS 2020
- Keggi JM, Lawrence JM, Randall AL, DeClaire JH, Ponder CE, Koenig JA, Shalhoub S, Wakelin EA, Plaskos C. Predictive Ligament Balancing in Robotic TKA - One Year Clinical Outcomes from a Multicenter Study CAOS 2020
- Wakelin EA, Shalhoub S, Lawrence JM, Keggi JM, Randall AL, Ponder CE, DeClaire JH, Koenig JA, Plaskos C. The Effect of Coronal and Axial Femoral Component Rotation on Midflexion Laxity and Patient Reported Outcomes in Total Knee Arthroplasty. CAOS 2020
- Wakelin EA, Shalhoub S, Koenig JA, Plaskos C. Tibial First Technique Using Predictive Balancing Improves Joint Balance Compared to Measured Resection CAOS 2020

- Plaskos C, Wakelin EA, Shalhoub S, Lawrence JM, Keggi JM, Koenig JA, Ponder CE, Randall AL, DeClaire JH. Frequency of Soft Tissue Releases and Their Effect on Patient Reported Outcomes in Robotic Assisted TKA CAOS 2020
- Orsi AD, Wakelin EA, Shalhoub S, Lawrence JM, Ponder CE, Plaskos C. Optimizing TKA Positioning via Intraoperative Ligament Characterization. CAOS 2020
- Romero J, Wakelin EA, Plaskos C. Effect of Coronal and Sagittal Deformity on Femoral Component Position in Gap Balancing Total Knee Arthroplasty (TKA) DKOU 2020
- Putman S, Wakelin EA, Migaud H, Pasquier G, Plaskos C. Incidence des caractéristiques anatomiques pouvant entraîner des difficultés de pose d'une PTG sur une population de PTG de première intention SOFCOT 2020

2019
- Plaskos C, Gill P, Lawrence JM. OMNI Case Study – OMNI BalanceBot Technology. Digital Orthopaedics Conference San Francisco (DOCSF) 2019
- DeClaire JH. Robot-Assisted Total Knee Arthroplasty with Active Ligament Tensioning. AAOS OVT 2019.
- DeClaire JH, Lawrence JM, Keggi JM, Koenig JA, Ponder CE, Randall AL, Shalhoub S, Wakelin EA, Plaskos C. The Impact of Intra-Operative Coronal Midflexionand Flexion Balance on Early Post-Operative Pain in Total Knee Arthroplasty AAHKS 2019
- Lawrence J, Shalhoub S, Lawrence D, Plaskos C. Non-linear Dynamic Behavior of Ligaments Balanced Under Tension in Robotic-Assisted Total Knee Arthroplasty AAHKS 2019
- Keggi JM, Lawrence JM, Randall AL, DeClaire JH, Shalhoub S, Wakelin EA, Plaskos C. Early Clinical Outcomes of a Novel Predictive Ligament Balancing Technique for Total Knee Arthroplasty AOA 2019
- Keggi JM, Lawrence JM, Randall AL, DeClaire JH, Shalhoub S, Wakelin EA, Plaskos C. Robotic-Assisted TKA Can Predict and Achieve Accurate Post-Operative Ligament Balance AOA 2019
- Keggi JM, Lawrence JM, Randall AL, DeClaire JH, Shalhoub S, Wakelin EA, Plaskos C. Intra-operative, real-time coronal ligament balance and its effect on patient-reported outcomes AOA 2019
- Lawrence JM, Keggi JM, Randall AL, Ponder CE, DeClaire JH, Shalhoub S, Wakelin EA, Plaskos C. Early Clinical Outcomes of a Novel Predictive Ligament Balancing Technique for Total Knee Arthroplasty ISTA 2019
- Lawrence JM, Lawrence D, Shalhoub S, Plaskos C. Ligament Tension and Balance in Robotic-Assisted TKA - Dynamic Changes with Increasing Applied Force ISTA 2019
- Wakelin EA, Shalhoub S, Lawrence JM, Koenig JA, Ponder CE, DeClaire JH, Randall AL, Keggi JM, Plaskos C. The impact of intra-operative coronal midflexion and flexion balance on early post-operative pain in TKA ISTA 2019
- DeClaire JH, Lawrence JM, Keggi JM, Randall AL, Ponder CE, Koenig JA, Shalhoub S, Wakelin EA, Plaskos C. Intra-operative, real-time coronal ligament balance and its effect on patient-reported outcomes ISTA 2019
- Plaskos C, Wakelin EA, Shalhoub S, Lawrence JM, Keggi JM, Koenig JA, Ponder CE, Randall AL, DeClaire JH. Soft-Tissue Release Rates in Robotic-Assisted Gap-Balancing and Measured-Resection TKA ISTA 2019
- Randall AL, DeClaire JH, Lawrence JM, Keggi JM, Plaskos C, Shalhoub S. The Extension Planning Angle in Gap-Balancing Total Knee Arthroplasty Influences Mid-Flexion Laxity. CAOS New York, June 2019
- Lawrence J, DeClaire JH, Randall A, Keggi J, Shalhoub S, Plaskos C. Robotic-Assisted TKA Can Predict and Achieve Accurate Post-Operative Ligament Balance. CAOS New York, June 2019
- Chen E, Koenig JA, Shalhoub S, Plaskos C. Accuracy of Soft Tissue Balancing in Robotic-Assisted Measured-Resection TKA Using a Robotic Distraction Tool. CAOS New York, June 2019

- Keggi JM, Lawrence JM, Randall A, DeClaire JH, Shalhoub S, Plaskos C. Early Clinical Outcomes of a Novel Predictive Ligament Balancing Technique for Total Knee Arthroplasty. CAOS New York, June 2019
- Chen E, Husain A, Billow N, Koenig JA, Plaskos C. Mid-Term Patient Reported Outcomes and Survivorship Following Robotic Assisted Total Knee Replacement: A Cohort Study. CAOS New York, June 2019
- Koenig JA, Plaskos C, Jordan E. Value of Robotics in Total Knee Arthroplasty - an Assessment of a Hospitals Experience in the CMS Bundled Payment for Care Improvement Model. CAOS New York, June 2019

2018
- Shalhoub S, Amanatullah DF, Fritsch B, Gill PS, Keggi JM, Lawrence JM, Plaskos C. Aiming for equal gaps at 0° and 90° of flexion does not produce an equal gap throughout the arc of flexion in total knee arthroplasty. AAOS New Orleans, USA, March 2018.
- Shalhoub S, Randall AL, Lawrence JM, Keggi JM, Plaskos C. Validation of a Laxity Prediction Algorithm for Gap-Balancing TKA. Orthopeadic Research Society (ORS). New Orleans, USA, March 2018.
- Shalhoub S, Plaskos C, Randall AL, Lawrence JM, Keggi JM. The Effect of Gap Balancing at 0° Versus 10° of Flexion on Extension and Mid-flexion Laxity in Total Knee Arthroplasty. Orthopeadic Research Society (ORS). New Orleans, USA, March 2018.
- Shalhoub S, Lawrence D, Plaskos C, Lawrence J. Does an increase in distraction force uniformly increase tibiofemoral gaps? Orthopeadic Research Society (ORS). New Orleans, USA, March 2018.
- Shalhoub S, Lawrence D, Plaskos C, Lawrence JM. Ligament Tension and Balance After Robotic-Assisted TKA – Dynamic Changes with an Increasingly Applied Force. Orthopeadic Research Society (ORS). New Orleans, USA, March 2018.
- Koenig JA, Plaskos C. 90-Day Costs and Clinical Results of Robotic-Assisted and Conventional TKA. International Society for Technology in Arthroplasty (ISTA), London, UK, Oct 2018
- Koenig JA, Neuhauser-Daley K, Shalhoub S, Plaskos C. Early Patient Outcomes and Satisfaction of Robotic-Assisted Total Knee Arthroplasty. International Society for Technology in Arthroplasty (ISTA), London, UK, Oct 2018
- Shalhoub S, Randall AL, Lawrence JM, Keggi JM, DeClaire JH, Plaskos C. Can We Predict Laxity in Robotic TKA Using Pre-operative Force-controlled Laxity Measurements? International Society for Technology in Arthroplasty (ISTA), London, UK, Oct 2018
- Shalhoub S, DeClaire JH, Keggi JM, Lawrence JM, Randall AL, Plaskos C. The Extension Planning Angle in Gap-Balancing Total Knee Arthroplasty Influences Mid-flexion Laxity International Society for Technology in Arthroplasty (ISTA), London, UK, Oct 2018

2017
- Moschetti WE, Keggi JM, Dabuzhsky L, Jevsevar DS, Shalhoub S, Plaskos C. Continuous assessment of ligamentous tension during total knee replacement demonstrates an anatomic cause for mid-flexion instability: A cadaveric study. Orthopeadic Research Society (ORS). San Diego, USA, March 2017.
- Shalhoub S, Plaskos C, Moschetti WE, Keggi JM, Jevsevar DS, Dabuzhsky L, Keggi JM. Continuous Tibiofemoral Gap Assessment of Ligamentous Laxity Profiles Before and After Robotic Assisted Total Knee Replacement. 15th Annual Meeting of the International Society for Computer Assisted Orthopaedic Surgery, Aachen, Germany, June 2017

2016

- Plaskos C, Todorov A, Joly C, Dabuzhsky L, Gill P, Jevsevar D, Keggi J, Koenig J, Moschetti W, Sydney S. A Novel Active Spacer System For Ligament Balancing In Robotic-Assisted Knee Arthroplasty – Concept Feasibility And Early Cadaver Results. 14th Annual Meeting of the International Society for Computer Assisted Orthopaedic Surgery, Osaka, Japan, June 2016
- Dabuzhsky L, Neuhauser-Daley K, Plaskos C. Post-Operative Manipulation Rates in Robotic-Assisted TKA Using a Gap Referencing Technique. International Society for Technology in Arthroplasty (ISTA), Boston, MA, USA, Oct 2016
- Keggi JM, Plaskos C. Learning Curve and Early Patient Satisfaction of Robotic-Assisted Total Knee Arthroplasty. International Society for Technology in Arthroplasty (ISTA), Boston, MA, USA, Oct 2016
- Plaskos C, Dabuzhsky L, Gill P, Jevsevar D, Keggi JM, Koenig J, Moschetti W, Sydney S, Todorov A, Joly C. Development of an Active Ligament Tensioner for Robotic-Assisted Total Knee Arthroplasty International Society for Technology in Arthroplasty (ISTA), Boston, MA, USA, Oct 2016
- Moschetti WE, Keggi JM, Dabuzhsky L, Jevsevar D, Plaskos C. Dynamic Robotic-Assisted Ligament Tensioning and Gap Balancing in Total Knee Arthroplasty - A Cadaver Study International Society for Technology in Arthroplasty (ISTA), Boston, MA, USA, Oct 2016

2013

- Clark TC, Plaskos C, Schmidt F. Robotic- vs Computer-assisted Navigation in Total Knee Arthroplasty – Intraoperative Efficiency and Accuracy. International Society for Technology in Arthroplasty (ISTA), West Palm, FL, USA, Oct 2013
- Ponder CE, Plaskos C, Cheal EJ. Press-fit total knee arthroplasty with a robotic-cutting guide – proof of concept and initial clinical experience. 13th Annual Meeting of the International Society for Computer Assisted Orthopaedic Surgery, Orlando, FL, USA, June 2013
- Koenig JA, Plaskos C. Influence of pre-operative deformity on surgical accuracy and time in robotic-assisted TKA. 13th Annual Meeting of the International Society for Computer Assisted Orthopaedic Surgery, Orlando, FL, USA, June 2013
- Cross MB, Klingenstein G, Plaskos C, Nam D, Li A, Lyman S, Pearle AD, Mayman DJ. A Loose Extension Gap during TKA Leads to Increased Mid-flexion Laxity. Orthopaedic Research Society, San Antonio, Texas, Jan 2013
- Cross MB, Klingenstein G, Plaskos C, Nam D, Li A, Lyman S, Pearle AD, Mayman DJ. An Elevated Joint Line after TKA Leads to Increased Mid-flexion Laxity. Orthopaedic Research Society, San Antonio, Texas, Jan 2013

2012

- Cross MB, Plaskos C, Nam D, Egidy CC, Nguyen JT, Lyman S, Pearle AD, Mayman DJ. Kinematics and Coronal Plane Stability Between a Posterior Stabilized vs Bicruciate Stabilized vs Ultracongruent Total Knee Arthroplasty. Orthopaedic Research Society, San Francisco, California, Feb 2012
- Cross MB, Raphael BS, Maak TG, Plaskos C, Egidy CC, Pearle AD. Characterization of the Orientation and Isometry of Humphrey's Ligament. Orthopaedic Research Society, San Francisco, California, Feb 2012
- Plaskos C, Dernier N, Cheal EJ, Ponder CE. Achieving Consistent Press-Fit in Total Knee Arthroplasty with a Robotic-Cutting Guide – Initial Concept Development and Validation. International Society for Technology in Arthroplasty (ISTA), Sydney, Australia, Oct 2012
- Koenig JA, Plaskos C. Usefulness of a Computer-navigated Robotic Cutting-guide System for Correcting Large Deformities in TKA. International Society for Technology in Arthroplasty (ISTA), Sydney, Australia, Oct 2012.
- Cross MB, Klingenstein G, Plaskos C, Nam D, Li A, Pearle AD, Mayman DJ; A Loose Extension Gap during TKA Leads to Increased Mid-flexion Laxity. International Society for Technology in Arthroplasty (ISTA), Sydney, Australia, Oct 2012.
- Klingenstein G, Cross MB, Plaskos C, Nam D, Li A, Lyman S, Pearle AD, Mayman DJ. An Elevated Joint Line after TKA Leads to Increased Mid-flexion Laxity. International Society for Technology in Arthroplasty (ISTA), Sydney, Australia, Oct 2012.

2011

- Cross MB, Plaskos C, Nam D, Egidy CC, Nguyen JT, Lyman S, Pearle AD, Mayman DJ. Kinematics and Coronal Plane Stability Between a Posterior Stabilized vs Bicruciate Stabilized vs Ultracongruent Total Knee Arthroplasty. HSS 23rd Annual Holiday Total Knee Course. Dec 2011, New York, NY
- Plaskos C, Nam D, Cross MB, Sherman S, Lyman S, Pearle AD, Mayman DJ. The Effect of 5mm Osteochondral Defects on Coronal Plane Knee Stability - A Cadaveric Study. Eastern Orthopaedic Association. 42nd Annual Meeting. Williamsburg, Virginia, Oct, 2011
- Koenig JA, Plaskos C. Total Knee Arthroplasty with a Robotic Cutting Guide – A retrospective study assessing accuracy and surgical time. International Society for Technology in Arthroplasty (ISTA), Brugges, Belguim, Sept 2011.
- Koenig JA, Plaskos C. Surgical accuracy and efficiency of computer-automated total knee arthroplasty – a report on the first 80 cases. 11th Annual Meeting of the International Society for Computer Assisted Orthopaedic Surgery London, UK, June 2011.
- Suero EM, Plaskos C, Dixon P, Pearle AD. Adjustable cutting blocks improve alignment and surgical time in computer assisted total knee replacement. 11th Annual Meeting of the International Society for Computer Assisted Orthopaedic Surgery London, UK, June 2011.
- Suero EM, Charles C, Citak M, Pearle AD, Plaskos C. Radiographic comparison of two different ankle registration techniques. 11th Annual Meeting of the International Society for Computer Assisted Orthopaedic Surgery London, UK, June 2011.
- Plaskos C, Cross MB, Nam D, Sherman S, Lyman S, Pearle AD, Mayman DJ. The Effect of 5 mm Osteochondral Defects on Coronal Plane Knee Stability–A Cadaveric Study. Orthopaedic Research Society, Jan 2011
- Cross MB, Nam D, Plaskos C, Sherman S, Lyman S, Pearle AD, Mayman DJ. The Effect of Distal Femoral Cut Height on Maximal Knee Extension and Coronal plane Stability in TKA - A Cadaveric Study Assessing the Effect of Recutting the Distal Femur. Annual meeting of the AAOS, Feb 2011

OPT-REC-MK-94 Rev 1