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Original Research

Seven-Year Outcomes of Total Knee Arthroplasty in a Consecutive Series of 257 Procedures: A Retrospective Multi-Surgeon Single-Centre Study

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Abstract

Background: Total knee arthroplasty (TKA) is one of the most commonly performed elective orthopaedic procedures worldwide, with consistently reported improvements in pain, function, and quality of life. Medium- to long-term outcomes in community-based multi-surgeon cohorts remain less documented than in high-volume academic centres. This study reports the seven-year clinical, functional, and survival outcomes of a consecutive TKA series performed at a single institution.

Methods: We conducted a retrospective monocentre study on 257 consecutive TKAs performed in 241 patients between January 2014 and December 2017 by three experienced orthopaedic surgeons. All procedures used cemented implants (posterior-stabilised in 243 cases, cruciate-retaining in 14 cases) through a medial parapatellar or mid-vastus approach. A standardised fast-track perioperative pathway was applied. Outcomes included the Knee Society Score (KSS), the Oxford Knee Score (OKS), range of motion (ROM), patient satisfaction, and implant survivorship using revision as the endpoint. Statistical analysis was performed using paired t-tests and Kaplan-Meier survival analysis.

Results: The mean follow-up was 7.1 ± 1.3 years. Mean KSS Knee and Function scores improved from 38.2 ± 11.4 and 41.5 ± 13.2 pre-operatively to 86.1 ± 8.7 and 82.4 ± 9.8 at seven years, respectively ($p < 0.001$). The mean OKS improved from 14.3 ± 5.6 to 39.1 ± 5.9 ($p < 0.001$). Mean flexion reached 116.9° at seven years. Overall, 96.1% of patients were satisfied or very satisfied. The seven-year Kaplan-Meier implant survival rate was 96.5% (95% CI: 94.2–98.8%). The overall revision rate was 3.5% (n = 9). The deep periprosthetic infection rate was 1.6%.

Conclusion: This multi-surgeon single-centre series demonstrates that consistent, excellent outcomes comparable to international reference cohorts can be achieved through standardised surgical technique, implant selection, and an enhanced recovery protocol. A seven-year survival of 96.5% and a patient satisfaction rate of 96.1% validate the quality and reproducibility of the institutional TKA programme.

Keywords: *Total Knee Arthroplasty; Retrospective Study; Functional Outcomes; Implant Survival; Patient Satisfaction; Fast-Track Protocol; Knee Society Score; Oxford Knee Score*

1. Introduction

Total knee arthroplasty (TKA) is among the most frequently performed elective surgical procedures in the world, with more than 1.5 million procedures carried out annually [1]. The procedure reliably alleviates chronic knee pain, restores functional capacity, and improves health-related quality of life in patients with end-stage gonarthrosis refractory to conservative management [2,3]. Longitudinal data consistently demonstrate durable clinical benefit across a range of patient populations, with ten-year implant survival rates typically exceeding 90–95% in large national joint registries [4,5].

Despite the overall success of TKA, approximately 15–20% of patients report dissatisfaction with their surgical outcome, a finding that has persisted despite advances in surgical technique, implant design, and perioperative care [6,7]. The determinants of patient satisfaction are multifactorial, encompassing pre-operative expectations, the degree of functional improvement achieved, residual pain, and complications. Understanding which institutional factors contribute to optimal outcomes is therefore of clinical and health-economic importance.

Most landmark TKA series originate from high-volume academic centres or large multicentre registries, which may not accurately reflect the results achievable in community hospital settings with diverse operative teams. Single-centre multi-surgeon studies that report consecutive, unselected cohorts offer complementary evidence by capturing real-world practice patterns and outcome variability across individual surgeons working within a shared institutional framework [8].

The primary aim of this study was to report seven-year functional outcomes, patient satisfaction, and implant survivorship following TKA in a consecutive cohort performed by three surgeons at a single institution. Secondary aims were to document perioperative complications and to compare our results with those reported in the contemporary international literature.

2. Materials and Methods

2.1 Study Design and Patient Population

This is a retrospective, single-centre, multi-surgeon study. All patients who underwent primary TKA at the Centre Orthopédique Orthos (Casablanca, Morocco) between January 2014 and December 2017 were considered eligible. The study was approved by the institutional ethics committee, and all participants provided written informed consent for data collection and analysis.

Inclusion criteria were: (1) primary TKA for symptomatic end-stage gonarthrosis; (2) minimum follow-up of five years; (3) complete pre- and post-operative clinical and radiographic data available. Exclusion criteria included: previous ipsilateral knee arthroplasty, active periprosthetic infection at another joint, and absence of baseline clinical scores.

A total of 281 consecutive TKAs were performed during the study period. After applying inclusion and exclusion criteria, 257 knees (241 patients, 16 bilateral cases) constituted the final study cohort. Three orthopaedic surgeons, each with a minimum of ten years' TKA experience and an annual caseload of >60 primary TKAs at study initiation, contributed to the series.

2.2 Surgical Technique

All procedures were performed under spinal anaesthesia, supplemented with a pre-operative femoral nerve block and intra-articular injection of a multimodal analgesic mixture (ropivacaine, ketorolac, adrenaline). A pneumatic tourniquet was applied in all cases.

The surgical approach was the medial parapatellar arthrotomy in 198 knees (77.0%) and the mid-vastus approach in 59 knees (23.0%). Four contemporary cemented implant systems were used: the ATTUNE® Knee System (DePuy Synthes, J&J MedTech) in 186 knees (72.4%), the NexGen® Legacy system (Zimmer Biomet) in 42 knees (16.3%), the Lepine® LP system (Lepine, France) in 18 knees (7.0%), and the Symbios® Knee System (Symbios Orthopedie, Switzerland) in 11 knees (4.3%). Implant constraint was a posterior-stabilised (PS) design in 243 cases (94.6%) and a cruciate-retaining (CR) design in 14 cases (5.4%). All femoral and tibial components were fixed with antibiotic-loaded bone cement.

The primary alignment strategy was conventional mechanical alignment (targeting a neutral mechanical axis of 0° ± 3°) in all cases. Patellar resurfacing was performed selectively in 41 knees (16.0%). Haemostasis was optimised with intra-articular administration of tranexamic acid (2 g in 100 mL normal saline, with intravenous bolus of 1 g at skin incision).

2.3 Perioperative and Rehabilitation Protocol

A standardised fast-track enhanced recovery after surgery (ERAS) pathway was applied to all patients. Patients received a standardised multimodal analgesic regimen including celecoxib, paracetamol combined with codeine, and gabapentin. Deep vein thrombosis prophylaxis consisted of enoxaparin 0.4 mL (4,000 IU anti-Xa) subcutaneously once daily for 25 days.

Full weight-bearing with a walking frame was initiated on the day of surgery or the first post-operative day. The mean hospital length of stay was 3.4 ± 1.1 days.

2.4 Outcome Measures

Pre-operative and post-operative assessments were performed at six weeks, six months, one year, two years, and then biennially. Primary outcome measures were the Knee Society Score (KSS) and the Oxford Knee Score (OKS, scored 0–48). Secondary outcomes included: active ROM, VAS pain score at rest, patient satisfaction (four-point Likert scale), and radiographic assessment. Implant survival was defined as freedom from revision surgery for any cause.

2.5 Statistical Analysis

Continuous variables are presented as mean ± standard deviation (SD) and range. Pre- to post-operative comparisons were performed using paired Student's t-tests. Statistical significance was set at $p < 0.05$. Kaplan-Meier survival analysis was used to estimate implant survivorship. Statistical analyses were conducted using SPSS® version 26.0 (IBM Corp., Armonk, NY, USA).

3. Results

3.1 Patient Demographics

The demographic characteristics of the study cohort are summarised in Table 1. The mean patient age at surgery was 71.4 ± 7.2 years (range: 52–87). The cohort comprised 168 women (65.4%) and 89 men (34.6%). The mean BMI was 30.1 ± 4.8 kg/m². The primary diagnosis was idiopathic primary osteoarthritis in 231 knees (89.9%), post-traumatic arthritis in 18 knees (7.0%), and rheumatoid arthritis in 8 knees (3.1%). The mean follow-up was 7.1 ± 1.3 years (range: 5.0–10.4 years).

3.2 Functional Outcomes

Functional outcomes are presented in Table 2. All outcome measures improved significantly between the pre-operative assessment and seven-year follow-up ($p < 0.001$ for all comparisons). The mean KSS Knee score improved from 38.2 ± 11.4 to 86.1 ± 8.7. The mean KSS Function score improved from 41.5 ± 13.2 to 82.4 ± 9.8. The mean OKS improved from 14.3 ± 5.6 to 39.1 ± 5.9. Mean maximal flexion improved from 98.4° ± 14.7° to 116.9° ± 13.1°. No statistically significant difference was observed between two-year and seven-year values ($p = 0.21$), indicating that functional gains were well maintained.

3.3 Patient Satisfaction

At seven years, 165 patients (64.2%) reported being very satisfied and 82 (31.9%) satisfied, yielding an overall satisfaction rate of 96.1%. Ten patients (3.9%) reported being unsatisfied or very unsatisfied. The most common reasons for dissatisfaction were residual anterior knee pain (n = 4), persistent stiffness (n = 3), and unresolved expectations (n = 3).

3.4 Radiographic Outcomes

Radiolucent lines (RLL) were identified in 22 knees (8.6%) at latest follow-up. All RLLs were non-progressive, incomplete, and less than 1 mm in thickness. No cases of progressive osteolysis were identified. The mean post-operative mechanical axis was 0.6° ± 2.4° varus, and 241 knees (93.8%) achieved a mechanical axis within ±3° of neutral.

3.5 Complications

Complications are detailed in Table 3. The overall complication rate was 10.5% (n = 27 knees). Nine knees (3.5%) required revision surgery. Periprosthetic joint infection (PJI) occurred in four knees (1.6%); two were managed with DAIR, and two required revision. Clinically significant joint stiffness occurred in eight knees (3.1%); six were treated with manipulation under anaesthesia (MUA), while two required revision arthroplasty. Three cases of aseptic tibial loosening required revision (1.2%). Thromboembolic events occurred in four patients: three deep venous thromboses (1.2%) and one pulmonary embolism (0.4%). Two periprosthetic fractures (0.8%) were treated with ORIF.

3.6 Implant Survivorship

Kaplan-Meier analysis demonstrated a seven-year implant survival rate of 96.5% (95% CI: 94.2–98.8%) using revision for any cause as the endpoint. When aseptic revision alone was used, the seven-year survival was 97.3% (95% CI: 95.4–99.2%).

Table 1. Patient Demographics and Baseline Characteristics (n = 257 knees, 241 patients).

Variable	Value	Range / SD
Number of knees (patients)	257 (241)	—
Mean age (years)	71.4 ± 7.2	52 – 87
Sex (Female / Male)	168 / 89	65.4% / 34.6%
BMI (kg/m²)	30.1 ± 4.8	20.4 – 43.7
Diagnosis — Primary OA	231 (89.9%)	—
Diagnosis — Post-traumatic OA	18 (7.0%)	—
Diagnosis — Rheumatoid arthritis	8 (3.1%)	—
Pre-op alignment — Varus	189 (73.5%)	—
Pre-op alignment — Valgus	45 (17.5%)	—
Pre-op alignment — Neutral	23 (9.0%)	—
Mean follow-up (years)	7.1 ± 1.3	5.0 – 10.4
ASA score I–II / III–IV	218 / 39	84.8% / 15.2%

OA: osteoarthritis; BMI: body mass index; ASA: American Society of Anesthesiologists physical status classification. Values are presented as mean ± SD or n (%).

Table 2. Functional Outcomes at Pre-operative Baseline, Two-Year, and Seven-Year Follow-up.

Outcome Measure	Pre-operative	2-year follow-up	7-year follow-up
KSS — Knee score (/100)	38.2 ± 11.4	84.6 ± 9.3	86.1 ± 8.7
KSS — Function score (/100)	41.5 ± 13.2	80.3 ± 10.7	82.4 ± 9.8
Oxford Knee Score (/48)	14.3 ± 5.6	37.8 ± 6.2	39.1 ± 5.9
ROM — Extension deficit (°)	8.2 ± 6.1	2.1 ± 3.4	1.8 ± 3.1
ROM — Mean flexion (°)	98.4 ± 14.7	118.6 ± 12.3	116.9 ± 13.1
VAS pain at rest (/10)	5.8 ± 2.1	1.2 ± 1.4	1.1 ± 1.3
Satisfaction — Very satisfied	—	68.1%	64.2%
Satisfaction — Satisfied	—	27.2%	31.9%
Satisfaction — Unsatisfied / Very unsatisfied	—	4.7%	3.9%

KSS: Knee Society Score; ROM: range of motion; VAS: visual analogue scale. Values are mean ± SD. All paired comparisons between pre-operative and seven-year values: $p < 0.001$.

Table 3. Complications and Management (n = 257 knees).

Complication	n (%)	Management
Periprosthetic joint infection	4 (1.6%)	2 DAIR, 2 revision
Arthrofibrosis / stiffness (ROM < 90°)	8 (3.1%)	MUA in 6, revision in 2
Deep venous thrombosis	3 (1.2%)	Extended anticoagulation
Pulmonary embolism	1 (0.4%)	Anticoagulation
Periprosthetic fracture	2 (0.8%)	ORIF in 2
Aseptic loosening	3 (1.2%)	Revision
Wound healing complication	4 (1.6%)	Local wound care / VAC
Patellofemoral pain / maltracking	5 (1.9%)	Conservative in 4, lateral release in 1
Total revisions (all causes)	9 (3.5%)	—

DAIR: debridement, antibiotics and implant retention; MUA: manipulation under anaesthesia; ORIF: open reduction and internal fixation; VAC: vacuum-assisted closure.

4. Discussion

The principal finding of this study is that TKA performed by three experienced surgeons within a standardised institutional programme yields consistent, excellent medium-term outcomes that are directly comparable to those reported in landmark international series and national joint registry data. A seven-year Kaplan-Meier survival of 96.5%, a patient satisfaction rate of 96.1%, and clinically meaningful improvements in all functional scores validate the quality of care delivered in a non-academic community hospital setting.

The functional results of our cohort align closely with those reported by comparable international studies. Bourke et al. [9] reported a mean KSS Knee score of 87.2 at five years in a consecutive series of 239 TKAs, while Baker et al. [10], in a large multicentre UK study, documented mean OKS values of 37.8 at five years. Our seven-year OKS of 39.1 ± 5.9 compares favourably with both references. ROM results are consistent with registry analyses reporting mean flexion of 110°–120° at medium-term follow-up [11].

The overall patient satisfaction rate of 96.1% in our series exceeds the 80–85% typically quoted in systematic reviews of TKA satisfaction [6,12]. This may reflect the meticulous pre-operative patient selection and education embedded in our ERAS pathway. As demonstrated by Bourne et al. [7], fulfilment of pre-operative expectations is the strongest determinant of patient-reported satisfaction.

Our complication profile is consistent with the published literature. The periprosthetic joint infection rate of 1.6% is within the 1–2% range reported by the 2022 International Consensus Meeting on PJI [13] and aligns with registry data from the AOANJRR. Our arthrofibrosis rate of 3.1% is comparable to the 2–4% reported by Kim et al. [14]. The low rate of thromboembolic events reflects the efficacy of our prophylaxis protocol using subcutaneous enoxaparin for 25 days.

The seven-year implant survival of 96.5% is in line with figures published by the NJR for England and Wales, which reports a seven-year revision rate of approximately 3–5% for primary cemented TKA [4]. The Swedish and Australian registries report comparable survival in the range of 95–97% at seven to ten years [5,15]. The near-exclusive use of a PS constraint (94.6%) reflects a deliberate institutional choice aimed at standardising the rehabilitation protocol across surgeons and patient profiles.

The standardisation of surgical technique across three surgeons is a central explanatory factor for our results. The implementation of a fast-track ERAS programme facilitated shorter hospital stays (mean 3.4 days) and early functional recovery, without compromising complication rates [17]. These findings support the growing literature demonstrating that institutional-level standardisation is a key driver of TKA outcomes [18].

4.1 Limitations

This study has several limitations inherent to its retrospective design. First, the absence of a control group prevents causal inferences. Second, the use of four different implant systems introduces a potential confounding variable, although no significant difference in outcomes was observed across groups. Third, the follow-up period of seven years does not permit definitive conclusions about long-term (>10 year) implant durability. A prospective, protocol-driven follow-up study extending to ten and fifteen years is planned.

5. Conclusion

This retrospective single-centre multi-surgeon study demonstrates that primary total knee arthroplasty, performed within a standardised institutional framework combining three experienced surgeon teams, modern cemented implants, and an evidence-based fast-track perioperative protocol, yields highly reproducible seven-year outcomes equivalent to those reported by international reference centres and national joint registries. A patient satisfaction rate of 96.1%, a seven-year implant survival of 96.5%, and clinically meaningful functional gains across all validated outcome measures support the validity of this institutional approach.

Ethical Approval

Approved by the local institutional ethics committee. All procedures were in accordance with the 1964 Helsinki Declaration.

Informed Consent

Written informed consent was obtained from all patients.

Conflict of Interest

The authors declare no conflict of interest.

Funding

No external funding was received.

Data Availability

Data are available from the corresponding author upon reasonable request.

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