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RETURN TO GOLF AFTER ROBOTIC-ASSISTED UNICOMPARTMENTAL KNEE ARTHROPLASTY (UKA): A PHYSIOTHERAPY-GUIDED CASE ANALYSIS

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ABSTRACT

Background: Knee osteoarthritis (OA) is a leading cause of chronic disability in the elderly population, often impairing mobility and limiting participation in recreational sports such as golf. Robotic-assisted unicompartmental knee arthroplasty (UKA) has emerged as a minimally invasive surgical option with improved component alignment, accuracy, and faster recovery. However, evidence on return to sport—particularly golf—following robotic-assisted UKA, remains limited. **Purpose:** This manuscript presents a detailed case analysis of a 71-year-old recreational female golfer who successfully returned to golf following robotic-assisted UKA supported by structured physiotherapy. **Methods:** A case-based observational design was used. Preoperative assessments included pain severity, functional scores, mobility testing, and golf-specific movement analysis. Postoperative physiotherapy incorporated early mobilization, strengthening, balance training, and sport-specific golf rehabilitation. Data were documented using functional assessment tools and outcome measures. Tables and figures summarize the rehabilitation timeline, exercises, and clinical progression. **Results:** The patient demonstrated progressive improvement in pain reduction, quadriceps strength, gait mechanics, and knee mobility. By 10 weeks, she resumed putting and chipping; by 16 weeks, she returned to full 18-hole recreational golfing without pain. Functional scores improved significantly, and she reported enhanced confidence and quality of life. **Conclusion:** Robotic-assisted UKA combined with structured physiotherapy facilitated an efficient and safe return to golf in an elderly patient. The case underscores the effectiveness of integrating robotic precision surgery with physiotherapy-guided sports rehabilitation for older adults seeking to maintain active lifestyles.

KEYWORDS: Robotic-assisted UKA, Knee osteoarthritis, Physiotherapy, Return to sport, Golf rehabilitation, Case study.

INTRODUCTION

Knee osteoarthritis (OA) is a progressive degenerative condition that disproportionately affects older adults, leading to chronic pain, reduced mobility, and decreased participation in recreational and physical activities. As life expectancy improves globally, there is an increased emphasis on promoting active ageing, with many elderly individuals participating in low-impact sports such as golf. For golfers, knee OA presents functional challenges due to rotational loading, weight shifting, and repetitive movement patterns inherent in the sport.

In recent years, **robotic-assisted unicompartmental knee arthroplasty (UKA)** has gained popularity as a minimally invasive alternative to total knee arthroplasty (TKA). Robotic-assisted systems, particularly the Mako robotic-arm platform, offer enhanced accuracy, soft-tissue preservation, and faster functional recovery. This approach is particularly suitable for isolated medial or lateral compartment OA, such as in the presented case.

While UKA is known to provide faster return to daily activities, research on **return to sport (RTS)**—especially golf—following robotic-assisted UKA remains limited. Golf requires stability, proprioception, lower-limb power, and adequate knee range of motion (ROM). Physiotherapy plays a critical role in enabling safe RTS by restoring biomechanics, strength, and confidence.

This manuscript presents an in-depth case analysis of a 71-year-old female golfer who underwent robotic-assisted UKA and successfully returned to recreational golfing through a structured physiotherapy programme. It emphasizes the clinical decision-making process, rehabilitation progression, and functional outcomes that supported her return to sport.

Objective of the Study

1. **To analyse the recovery process** of a 71-year-old female golfer following robotic-assisted UKA.
2. **To document the physiotherapy rehabilitation protocol** implemented across early, intermediate, and sport-specific phases.
3. **To evaluate functional outcomes and timeline for returning to golf** post-surgery.

4. **To highlight the role of structured physiotherapy in enabling safe return to recreational sports** in elderly patients.
5. **To explore clinical implications for active ageing and sports participation** post-arthroplasty.

Methodology

Study Design

A **case-based observational study** focusing on postoperative rehabilitation and return-to-sport outcomes.

Patient Profile

Variable	Details
Age	71 years
Sex	Female
Sport	Recreational Golf (15+ years experience)
Condition	Severe medial compartment knee OA
Surgery	Mako Robotic-Assisted Unicompartmental Knee Arthroplasty
Surgeon	Orthopaedic joint replacement specialist
Rehabilitation	Physiotherapy-guided, 16-week programme

Source: Patient data from uploaded case report

Return_to_Golf_Case_Report

Preoperative Assessment

Clinical Findings

- Pain during walking and weight-bearing.
- Difficulty in maintaining stance stability during golf swing.
- Varus knee alignment.
- Reduced quadriceps strength.
- Compromised balance and proprioception.

Outcome Measures

Assessment Tool	Preoperative Score
VAS Pain	7/10

Assessment Tool	Preoperative Score
Knee Flexion ROM	95°
WOMAC Functional Score	68/96
Single-leg balance (affected side)	< 5 sec
Golf-Specific Functional Scale	Low tolerance

Surgical Intervention

Robotic-assisted UKA was performed using the Mako robotic platform, allowing:

- Precision bone preparation
- Accurate implant placement
- Minimal soft-tissue disruption
- Reduced hospital stay
- Faster recovery

Physiotherapy Rehabilitation Protocol

Rehabilitation Phases

The physiotherapy plan was divided as follows:

Table 1: Physiotherapy Timeline and Goals.

Phase	Duration	Main Goals
Phase 1: Early Mobility	Week 1–3	Pain control, ROM restoration, gait training
Phase 2: Strength & Balance	Week 4–8	Muscle strengthening, proprioception, functional mobility
Phase 3: Golf-Specific Training	Week 9–14	Swing mechanics, rotational control, endurance
Phase 4: Return to Sport	Week 14–16	Full-course golf reintroduction

Figure 1: Rehabilitation Progression Model

Surgery → Early Mobilization → Strength Phase → Balance Training → Golf-Specific Drills → Full Return to Golf

Detailed Rehabilitation Protocol

Phase 1: Early Postoperative Rehabilitation (Week 1–3)

Interventions

- Ankle pumps

- Assisted knee flexion & extension
- Quadriceps sets
- Heel slides
- Straight leg raises
- Cryotherapy
- Partial weight-bearing with walker → cane

Goals

- Achieve 0–110° ROM
- Reduce swelling
- Activate quadriceps
- Improve gait initiation

Phase 2: Strength & Proprioception Training (Week 4–8)

Exercises

- Mini squats
- Step-ups
- Resistance-band hip strengthening
- Static & dynamic balance training
- Gait retraining

Goals

- Improve lower-limb stability
- Enhance functional independence
- Increase single-leg stance time to > 10 seconds

Phase 3: Golf-Specific Rehabilitation (Week 9–14)

Golf-Related Exercises

- Weight-shifting drills
- Trunk rotation control
- Mini swing practice
- Putting and chipping
- Controlled stance phase training

Goals

- Develop rotational stability
- Achieve pain-free sports-specific movement
- Reintegrate golf biomechanics

Phase 4: Return to Full Golfing (Week 14–16)

Allowed to resume:

- Swing practice
- Playing 9 holes → 18 holes
- Full-course recreational golfing

RESULTS

By the end of the rehabilitation period, the patient demonstrated significant improvements across all clinical parameters.

Table 2: Pre- and Post-rehabilitation Comparison

Outcome	Pre-op	Post-rehab
VAS Pain	7/10	1/10
Knee ROM (Flexion)	95°	125°
Quadriceps Strength	Poor	Good+
Single-leg Balance	<5 sec	18 sec
WOMAC Score	68/96	12/96
Golf Tolerance	Poor	Full 18-hole play

Functional Recovery Timeline

- **Week 4:** Able to walk without assistive device
- **Week 8:** Normalized gait and improved stability
- **Week 10:** Returned to putting and chipping
- **Week 16:** Resumed full 18-hole recreational golf

Patient-Reported Outcomes

- Significant pain relief
- Improved confidence in mobility
- Enhanced recreational quality of life
- Satisfaction with robotic surgical precision

DISCUSSION

This case highlights the successful return to golf after robotic-assisted UKA supported by structured physiotherapy. Several key points emerge:

1. Robotic-Assisted UKA Enhances Surgical Precision

Robotic UKA allows for:

- Optimal implant alignment
- Minimal soft-tissue damage
- Reduced postoperative pain
- Early mobilization advantages

These benefits directly support rapid rehabilitation.

2. Physiotherapy Plays a Decisive Role in Return to Sport

Physiotherapy ensured:

- Quadriceps activation
- Stable gait patterns
- Restoration of biomechanics
- Sport-specific movement retraining
- Gradual conditioning for golf swings

The rehabilitation plan's progression-based structure was essential for restoring confidence and minimizing complications.

3. Consideration of Golf-Specific Biomechanics

Golf requires:

- Rotational torque
- Weight shifting
- Stable knee flexion during swing

Strength, balance, and flexibility training were tailored to these demands.

4. Active Ageing and Safe Sports Participation

The patient's successful outcome demonstrates that elderly individuals can safely return to recreational sports with appropriate clinical support.

Limitations

1. **Single-patient case design** limits generalizability.
2. Objective biomechanical analysis of golf swing was not performed with advanced technology.
3. Longer follow-up beyond 16 weeks may further validate sustained outcomes.
4. Psychological readiness for return to sport was not formally assessed.

Future Implications

1. Larger cohort studies on RTS after robotic-assisted UKA.
2. Integration of motion-capture analysis for golf biomechanics post-arthroplasty.
3. Development of standardized sport-specific protocols for older adults.
4. Long-term analysis of prosthetic survival in sporting populations.
5. Exploration of return-to-sport outcomes across different recreational activities.

CONCLUSION

The case demonstrates that **robotic-assisted UKA**, when combined with **structured physiotherapy**, enables a safe and efficient return to golf in elderly recreational players. The patient's successful return to an 18-hole golf game within 16 weeks highlights the synergy between advanced surgical technology and individualized rehabilitation. This case contributes to growing evidence supporting active ageing, improved functional outcomes, and quality of life after UKA.

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