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Original Research

Patient satisfaction following unicompartmental knee arthroplasty: Current concepts

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ABSTRACT

Unicompartmental knee arthroplasty (UKA) has gained progressive popularity in recent decades, currently comprising approximately 10% of knee arthroplasties in the United States. Nonetheless, UKA has not yet solidified its position as the superior treatment for isolated compartment osteoarthritis, as initially reported implant survivorship was subpar, leading to hesitation in its utilization and stricter patient indications compared to total knee arthroplasty. Patient satisfaction following knee arthroplasty has emerged as a critical metric to gauge patient acceptance and contentment with surgical interventions.

Currently, a variety of UKA types exist, differing in bearing design, fixation techniques such as cementless or cemented fixation, and robotic-assisted systems, each with its own merits and drawbacks. Multiple studies have demonstrated the contributions of these innovations to improve clinical outcomes and implant survivorship. However, the abundance of studies has made it challenging to establish a clear overview. This paper provides an overview of the current concepts of UKA, evaluating various aspects of UKA referencing to patient satisfaction and providing a recap of its historical development.

Available research demonstrated no significantly universal superior variant of UKA.

Current concepts:

- Mobile- and fixed-bearing designs in unicompartmental knee arthroplasty (UKA) have both demonstrated excellent patient satisfaction without significantly different patient outcomes, with different indications and modes of failure.
- Early postoperative pain relief and accuracy of implant positioning may be better following robotic-assisted UKA compared to conventional UKA. However, a clear significant difference in patient satisfaction has not been reported.
- Approximately 80–90% of patients who previously participated in sports can expect to return to low-impact sports within one year following UKA. This rate of return to sport is higher than that of total knee arthroplasty. Most UKA patients can anticipate to return to work within three months.
- Available research demonstrated no significantly universal superior variant of UKA.

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Future perspectives:

- Research should focus on developing patient indications to create comprehensive guidelines to match each unique knee to its optimal treatment, as arthroplasty is continuously shifting toward an increasingly patient-specific surgical approach.
- Research should focus on optimization of adhering to patient needs and expectations during knee arthroplasty, as an influential factor affecting patient satisfaction is the degree to which postoperative outcomes align with a patient's expectations.

INTRODUCTION

With an aging and increasingly overweight population, the global prevalence of knee osteoarthritis (OA) is increasing. OA of the knee is the leading cause of musculoskeletal disability worldwide and is associated with reduced quality of life, progressive restriction in daily activities, and increased healthcare expenditure [1].

The utilization of unicompartmental knee arthroplasty (UKA) within modern knee arthroplasty is well established, as it has proven to be an excellent treatment for isolated compartment OA in appropriately selected patients. In the United States, UKAs comprise approximately 10% of knee arthroplasties, with lateral UKAs comprising 1% of knee arthroplasty [2]. Nonetheless, UKA has not yet solidified its position as a superior treatment for isolated compartment OA, as initially reported implant survivorship, when the UKA was first introduced, was subpar. Stricter patient indications resulted in an improvement of implant survivorship and outcomes. Advancements in implant design and surgical indications have yielded outcomes that were comparable to, or even exceed those of total knee arthroplasty (TKA) [3]. Results from numerous studies have consistently demonstrated that UKA has several advantages over TKA, including the less invasive nature of the procedure, improved postoperative pain relief, greater postoperative range of motion, earlier return to sports, and return to work, and higher patient satisfaction [4–7].

The concept of patient satisfaction following knee arthroplasty has gained substantial popularity as a comprehensive measure of patient acceptance and contentment with the surgical procedure. Possible factors affecting patient satisfaction following knee arthroplasty included appropriate patient selection, the fulfillment of preoperative patient expectations, the attainment of effective pain relief, and the overall quality of the hospital experience [8]. This paper aimed to investigate patient satisfaction following UKA, its historical development, and to draw comparisons between variants of UKA. These included medial and lateral UKA, mobile- and fixed-bearing designs, the utilization of robotic-assisted systems versus conventional procedures, and fixation techniques.

HISTORICAL DEVELOPMENT OF THE UNICOMPARTMENTAL KNEE ARTHROPLASTY

Implant design and fixation technique

The UKA can be traced back to the early 1950s, when McKeever introduced the concept of resurfacing a single knee compartment to address unicompartmental OA. Macintosh performed his first UKA, noticing that the arthritic medial deformity could be corrected by tightening the medial collateral ligament. However, results were disappointing [9].

UKA advancements occurred in the 1970s when the first modular UKAs were developed. These included the Marmor knee (Fig. 1), Liverpool knee, St. George Sled, and Insall's unicondylar knee. These arthroplasties are generally composed of a convex unicondylar metallic prosthesis with a flat polyethylene component, allowing for rotation, thus preventing stress, and minimizing wear. Marmor was the first to describe the utilization of UKA for lateral compartment OA, with 11 out of 14 patients showing excellent results [10].

Although some studies reported promising early results with the various modular UKA designs, most studies demonstrated variable and suboptimal outcomes [11]. For instance, Insall and Walker reported unsatisfactory results among patients who underwent either a lateral or medial UKA, with 54% of knees showing unsatisfactory results at a minimum of two years of follow-up [12]. Additionally, a study by Insall and Aglietti showed a 28% conversion rate to TKA following initial UKA treatment for medial OA at a minimum of five years of follow-up [13].

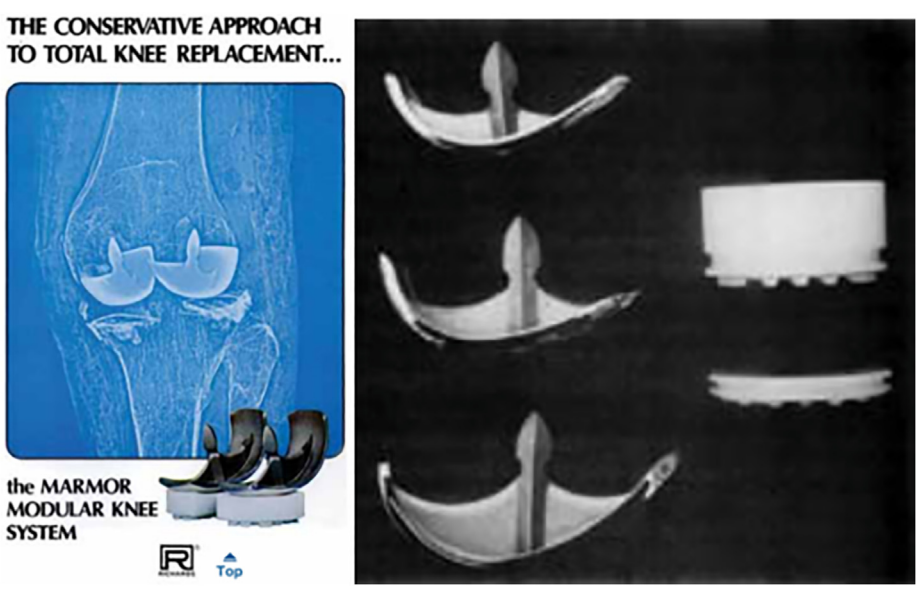

Fig. 1. Marmor's Modular Knee prosthesis, by Richard's Manufacturing Corporation [10].

The disappointing results were attributed to inaccurate patient selection, technical errors, and suboptimal implant design. These challenges hampered the development of UKA and led to a decline in its utilization.

Traditionally, cemented fixation of the implant components to the native bone was standard for its quick fixation and reliable long-term results [14]. However, due to polyethylene wear-induced osteolysis, knee surgeons started investigating cementless fixation techniques in the 1980's. Early results of the cementless fixation in TKA were disappointing with high failure rates of up to 19% due to failure of ingrowth and increased subsidence [15]. This was later attributed to incorrect patient indications, as primarily young patients benefited from cementless fixation as their bone ingrowth was better [14]. Currently, improvements in cement composition, surface design, and patient indication have revived the use of cementless fixation [2,14].

The introduction of the Oxford Knee by Goodfellow and O'Connor may have been the greatest advancement in modern UKA design. This design featured a spherical femoral component, flat tibial component, and a mobile-bearing polyethylene insert. The aim of the mobile-bearing design was to improve congruency and expand contact area, while simultaneously decreasing contact stress and polyethylene wear. The first Oxford Knee was introduced in 1976 as a bicompartmental knee prosthesis. The Oxford Knee has had the same design since 1982, but numerous changes have been made to its instrumentation and method of implementation, which facilitated a minimally invasive surgical procedure, resulting in even better outcomes. The current phase three Oxford UKA was introduced in 1998. Changes to the phase 2 Oxford Knee were a wider variety of sizes and the introduction of new instrumentation, allowing for a minimally invasive procedure [3].

Patient selection

Inappropriate patient indications for UKA were an influential factor for the high failure rates [3]. To decrease failure rates, Kozinn and Scott introduced comprehensive guidelines for UKA patient selection, which were considered fundamental for assessing patient eligibility. These indications included the presence of isolated unicompartmental OA, a patient age of over 60 years old, a body weight below 82 kg, to retain from engaging in demanding physical activity, an intact anterior cruciate ligament (ACL), correctable deformities <15° and a preoperative range of motion exceeding 90° (Fig. 2) [16]. The application of patient indications demonstrated notably superior outcomes, with 94% of patients reporting lasting pain relief and 0% failure rate at 5.5 years of follow-up [17]. Nowadays, these patient indications have predominantly been abandoned as surgical techniques for UKA have improved.

	CLASSIC INDICATIONS	EXTENDED INDICATIONS
Age	>60 years old	>40 years old
Weight	<180 pounds	Body mass index < 30kg/m^2
Activity Level	Low to medium levels	Medium to high levels
ACL Status	Intact	Intact
Deformity	<15 degrees	<10 degrees of varus
	Passively correctable to neutral intra-operatively	<10 degrees of flexion contracture

ACL, anterior cruciate ligament

Fig. 2. Patient indications described by Kozinn and Scott for unicompartmental knee arthroplasty [16].

Instrumentation

More recently, robotic-assisted and computer-navigated systems have been introduced to knee arthroplasty. It has been proposed that one of the most impactful reasons for a relatively high revision rate for UKA was implant malpositioning. A more accurate implant positioning with fewer outliers could therefore improve UKA revision rates and knee function. Consequently, devices to assist with implant positioning using navigation by optical trackers during UKA surgery were developed. A robotic-assisted system was first described in 1993, and the Acrobot Assistance system for UKA was introduced in 2000. In 2006, Cobb et al. reported that the use of a robotic-assisted system led to more accurate tibiofemoral alignment in UKA [18]. Since then, the utilization of robotic-assisted systems has increased, resulting in numerous different systems and applications [2].

PATIENT SATISFACTION IN MEDIAL AND LATERAL UNICOMPARTMENTAL KNEE ARTHROPLASTY AND TOTAL KNEE ARTHROPLASTY

A high patient satisfaction remains a highly sought-after goal following any medical treatment as it subjectively quantifies overall patient contentment with the surgical treatment. Therefore, it has often been interpreted as an important outcome to quantify the success of the surgery from a patient's perspective. Although some recent studies have reported similar failure rates of UKA compared to TKA, national registry-based studies still report an inferior failure rate for UKA [19,20]. Many orthopedic surgeons still favor primary TKA over UKA for isolated compartment OA, due to its similar outcomes and broader patient indication [21,22]. UKA and TKA have both demonstrated excellent mid to long-term outcomes and have been subjects of debate in clinical trials. Thus, this paragraph will provide an overview of patient satisfaction following UKA and TKA.

Unicompartmental and total knee arthroplasty

UKA is a minimally invasive surgical procedure in which the affected isolated compartment of the knee is resurfaced, the collateral ligament laxity is corrected and the lower leg alignment is ideally restored to its prearthritic state [22–24]. In essence, by resurfacing the affected compartment, the knee condition will be largely preserved [25]. UKA is associated with a shorter surgery time, superior postoperative pain relief, and enhanced postoperative range of motion [4,5].

Consensus remains that TKA demonstrates a lower risk of revision [22,23]. The TKA procedure differs considerably from UKA. Whereas the UKA restores the knee joint, TKA replaces the affected knee joint. Manipulation of coronal and sagittal knee alignments is often required to achieve improved balancing, and the knee ligaments may be subject to release, depending on gap balancing and the cruciate retaining or cruciate sacrificing designs. These distinctive differences in technical procedure between UKA and TKA have resulted in differences in outcomes.

Assessing patient satisfaction, it is imperative to acknowledge that most comparative studies involving UKA are centered on medial UKA, as lateral UKAs are less frequently performed. Patients who underwent

either a medial or lateral UKA reported patient satisfaction ranging from 81% to 92% after a minimal follow-up of one year [5,6]. For TKA, satisfaction ranged from 71% to 81% [5,6]. Jansen et al. compared patient satisfaction between UKA and TKA in preoperative OA severity-matched cohorts [6]. This study concluded that a significantly greater proportion of patients in the UKA than in the TKA cohort were 'satisfied or very satisfied' at a minimum of one year of follow-up (90% vs 81%, $p = 0.043$) [6]. A prospective study with 116 patients comparing patient satisfaction between both medial and lateral UKA and TKA reported similar results, with a significantly higher patient satisfaction for patients who underwent a UKA (9.0/10.0 vs 8.8/10.0, $p = 0.019$) [5]. Zuiderbaan et al. reported a significantly superior Forgotten Joint Score at one (73.9 ± 22.8 vs 59.3 ± 29.5, $p = 0.002$) and two years (74.3 ± 24.8 vs 59.8 ± 31.5, $P = 0.004$) postoperatively in favor of medial UKA compared to TKA [26]. Finally, a randomized controlled trial by Beard et al. with five years of follow-up concluded the superiority of medial UKA over TKA for the treatment of isolated medial OA, based on lower costs (-£910 per patient) and better cost-effectiveness (+0.240 quality-adjusted life years), although clinical outcomes were not significantly different [27].

As previously mentioned, patient satisfaction is affected by the extent to which postoperative outcomes align with patient expectations. These expectations can be influenced by variables such as age, culture, social class, and religious beliefs. To mitigate the impact of age on patient's expectations and therefore patient satisfaction, Von Keudel et al. conducted a retrospective study comparing patient satisfaction in UKA and TKA within the framework of an age-dependent analysis [4]. This study reported greater patient satisfaction among patients under the age of 55 who had undergone UKA, whereas patients aged over 65 showed greater satisfaction following TKA. Additionally, the study found a significant interaction between age group and procedure for satisfaction ($p = 0.010$) [4]. This underlines the age-dependent nature of patient satisfaction, driven by the difference in patients' expectations. Younger patients may have expectations of returning to their preoperative levels of athletic ability, whereas elderly patients may have more modest expectations. In summary, UKA demonstrates superior patient satisfaction over TKA as a treatment of isolated compartment OA.

Medial and lateral unicompartmental knee arthroplasty

The anatomical and biomechanical characteristics of the medial and lateral compartments differ considerably, and both medial and lateral UKA have demonstrated commendable outcomes. Upon examination of existing literature, it was evident that patient satisfaction following both conventional medial and lateral UKA yielded similar results. Banger et al. reported a Forgotten Joint Score for medial UKA of 52 out of 100 at five years of follow-up, which was considered a moderate score [28]. On the other hand, Kim et al. reported an excellent Knee Society Score of 85.4 ± 9.1 at a minimum of ten years of follow-up for conventional medial UKA [29]. Both the Forgotten Joint Score and Knee Society Score are subjective metrics to gauge a patient's satisfaction and functional ability. Studies reporting on lateral UKA indicate patient satisfaction rates ranging from 94% to 96% [30–32]. A retrospective analysis conducted by van der List et al. reported high levels of patient satisfaction for medial- and lateral UKA, without statistically significant differences at a mean follow-up of 2.4 years. However, significantly less joint awareness was reported for lateral UKA compared to medial UKA (55.3 ± 28.5 vs. 85.3 ± 19.5, $p = 0.010$) [33].

The comparison of patient satisfaction between medial- and lateral UKA is hindered by the scarcity of lateral UKA procedures and the difference in underlying disease. Although multiple studies have evaluated patient satisfaction for both medial- and lateral UKAs, these studies often do not report outcomes separately for the individual surgical treatments. In summary, both medial and lateral UKA have demonstrated good patient satisfaction, and no significant differences have been found. Caution should be exercised when comparing results or when applying guidelines between medial- and lateral UKA, acknowledging the distinct anatomical and biomechanical characteristics of both compartments.

PATIENT SATISFACTION IN FIXED-BEARING AND MOBILE-BEARING UNICOMPARTMENTAL KNEE ARTHROPLASTY

UKA was initially developed as a fixed-bearing design, in which the polyethylene insert was securely fixed in place within the tibial component. Even today, most fixed-bearing designs still adhere to the foundational principles of the Marmor modular knee prosthesis, characterized by a convex femur and a nearly flat concave polyethylene articular surface [10].

Despite initial commendable outcomes for fixed-bearing designs, concerns were raised regarding its association with increased contact stress, potentially predisposing it to a higher risk of tibial loosening and polyethylene wear [34]. Consequently, the concept of mobile-bearing designs was introduced with the intention of improving congruency and expanding contact area, while simultaneously decreasing contact stress and polyethylene wear [35]. Despite the theoretical advantages of the mobile-bearing design, there is a paucity of studies demonstrating its overall superiority over the fixed-bearing design, suggesting no definitive advantage of one bearing design over the other [3,35].

Mobile-bearing and fixed-bearing designs

Regarding patient satisfaction, numerous studies have consistently demonstrated that patients can anticipate a high level of patient satisfaction following both fixed and mobile-bearing UKA. Kagan et al. reported a patient satisfaction rate of 86% for patients who underwent fixed-bearing UKA at ten years of follow-up, indicating that most patients are "satisfied" or "very satisfied" [36]. Other studies on fixed-bearing UKA demonstrated even higher results. Pumilia et al. reported a patient satisfaction rate of 93% at a mean follow-up of 4.2 years and Bayoumi et al. reported a satisfaction rate of 91.7% at 10 years of follow-up [21,37].

The Oxford partial knee replacement, recognized as the most frequently used mobile-bearing UKA, has undergone continuous development in surgical techniques since its introduction, leading to excellent clinical outcomes [38]. Regarding patient satisfaction, Malhotra et al. reported a mean Knee Society Satisfaction Score of 29.7 out of 38 at 2.3 years of follow-up [39]. Furthermore, Walker et al. evaluated clinical outcomes and implant survivorship in mobile-bearing lateral UKA. Their findings, with a follow-up of 3.1 years, demonstrated a similar implant survivorship rate of 90.1%. Clinical outcomes were commendable with a mean Oxford Knee Score of 40.3 (95% confidence interval 39.4–41.2), and a mean University of California, Los Angeles score of 5.7 (95% confidence interval 5.5–5.9) [40].

A recent, single-center study by Pronk et al. reported no significant difference between the two UKA-bearing designs, as both yielded excellent patient satisfaction with a mean numeric rating scale of 9 out of 10 at 6, 12, and 24 months follow-up [41]. A study by Bhattacharya et al. showed similar results between fixed and mobile-bearing medial UKA, reporting a patient satisfaction of 83.5% in the fixed-bearing cohort compared to 93.9% in the mobile-bearing cohort, with no significant differences [42]. Multiple systematic reviews and national registry studies have compared mobile- to fixed-bearing UKAs, showing no differences in clinical outcomes, complications, and implant survivorship [43,44]. However, none of these have evaluated patient satisfaction.

Studies have demonstrated substantial disparities in the timing and patterns of implant failure between both bearing designs. Mobile-bearing designs have shown an association with bearing dislocation and therefore early failures, while fixed-bearing designs have been linked to polyethylene wear and thus later onset failures [43,44]. In conclusion, these bearing designs have demonstrated excellent patient satisfaction without significant differences, both with different modes of failure. Future research should focus on developing optimal patient indications for the two bearing designs, taking ACL deficiency and native tibial slope into account, as these may affect bearing dislocation and wear.

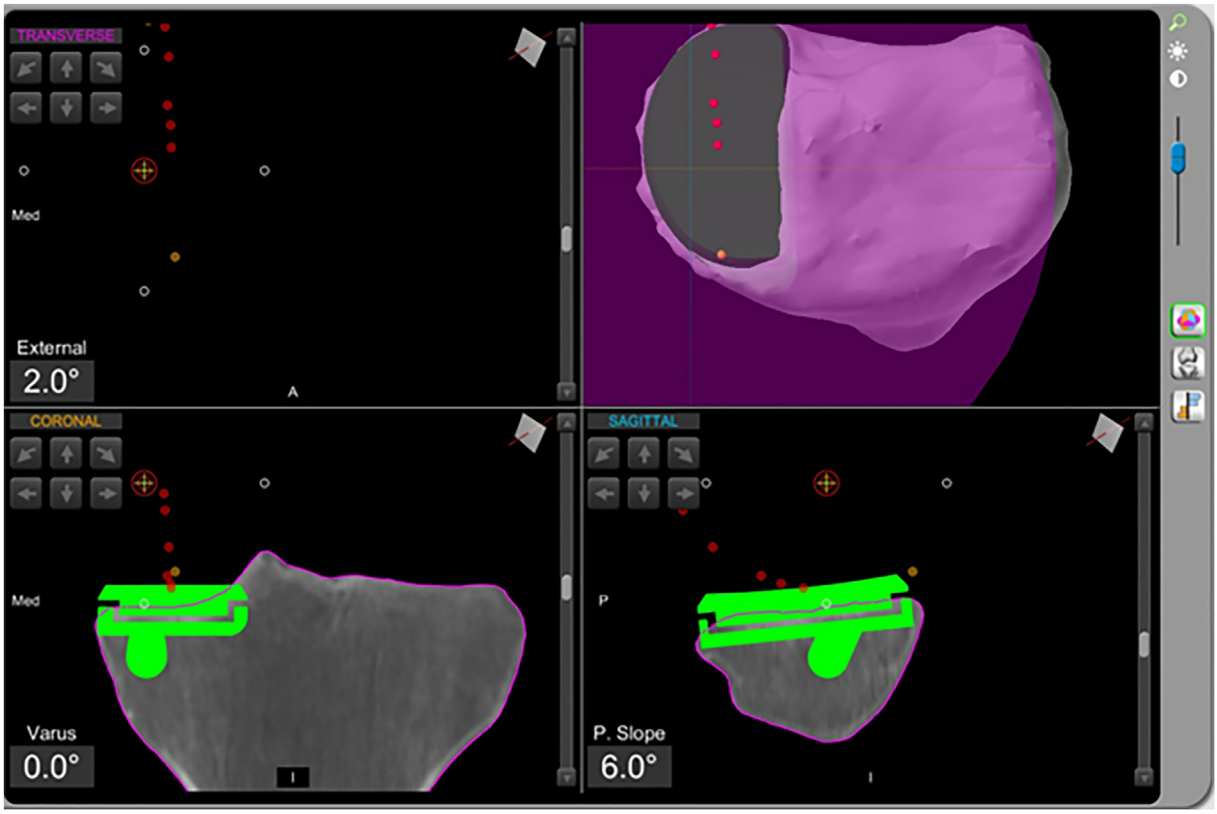

Fig. 3. Robotic-assisted unicompartmental knee arthroplasty, preoperative planning of the tibial component position. Possible further adjustments being made intraoperatively.

PATIENT SATISFACTION IN ROBOTIC-ASSISTED AND CONVENTIONAL UNICOMPARTMENTAL KNEE ARTHROPLASTY

Historically, UKA was considered a technically challenging procedure that posed difficulties for the surgeon. The introduction of robotic-assisted systems made the UKA procedure less surgically demanding and provided improved accuracy of implant positioning. These systems allowed the surgeon to digitally plan the position of the UKA implant before any bony cuts were made, subsequently executing it with extreme precision with the use of various robotic systems that are currently on the market. Cobb et al. were the first to demonstrate a significantly higher rate of accurate coronal alignment implant positioning within two degrees of the preoperatively planned position in favor of the robotic-assisted UKAs (100% vs 40%, $p = 0.001$) [18]. However, opinions on the utility of robotic-assisted- and computer-navigated systems in knee arthroplasty differ. Advocates of robotic-assisted UKA argued that it enhanced bone preparation accuracy and implant positioning, reduced technical variability, and improved the restoration of the prearthritic limb alignment [45]. Some studies suggested that robotic-assisted UKA was associated with shorter hospital stays, better postoperative pain relief, and improved functional outcomes. However, to date, these advantages have not appeared to result in superior implant survivorship (Fig. 3, Fig. 4) [43,44].

Multiple studies have demonstrated that patients can expect high postoperative satisfaction following robotic-assisted UKA, possibly due to the improved early pain relief it offers, which is likely caused by reduced tissue damage [46]. In a multicenter, retrospective study, Kleeblad et al. reported a 91% patient satisfaction rate in robotic-assisted UKA patients with a follow-up of five years [47]. Similarly, Marcovigi et al. reported patient satisfaction rates ranging from 88% to 91% with a follow-up of 1.4 years, and Bayoumi et al. noted a patient satisfaction range of 90.4%–91.8% after robotic-assisted UKA with a follow-up of 4.4 ± 1.6 years [23,48].

There is a shortage of studies comparing patient satisfaction between robotic-assisted and conventional UKA. Studies by Banger et al. and Crizer et al. found no significant difference in patient satisfaction between robotic-assisted and conventional medial UKA after five and two years of follow-up, respectively [28,49]. A meta-analysis by Zhang et al. comprising 11 studies comparing clinical outcomes between robotic-assisted and conventional UKA found a reduced complication rate (relative risk 0.62, $p = 0.004$) in favor of the robotic-assisted UKA [50]. In summary, some studies have demonstrated postoperative pain relief to be better following UKA. However, this has not translated to significant differences in patient satisfaction.

RETURN TO SPORT AND RETURN TO WORK FOLLOWING UNICOMPARTMENTAL KNEE ARTHROPLASTY

The increasing younger age at which patients are undergoing a UKA has altered patient expectations, since a growing number of patients are still of sporting and working age.

Fig. 4. Robotic-assisted surgery of unicompartmental knee arthroplasty, placement of optical trackers which will guide femoral and tibial bony cuts.

Return to sport

Current recommendations for return to sport are primarily based on guidelines described by the American Association of Hip and Knee Surgeons (AAHKS) and The Knee Society [51,52]. These advocate for postoperative participation in low-impact sports (e.g., golf or yoga), and only advise on participation in moderate-impact sports (e.g., volleyball or running), when patients had previous experience in the sport. However, these guidelines do not distinguish between TKA and UKA and are largely based on surgeon preference and survey data. Moreover, reported return-to-sport rates and recommendations are divergent due to the absence of universal definitions categorizing sports as low, moderate, or high impact.

A systematic review by Waldstein et al. reported a wide range in rates of return-to-sport after UKA, varying from 74% to 100% across seven studies [53]. Radhakrishnan et al. concluded that approximately 92.7% of patients can return-to-sport following UKA [54]. Approximately 48% of patients resumed sports activities within three months postoperatively, and 76.5% achieved return-to-sport within six months, albeit at a reduced intensity compared to their preoperative return-to-sport levels [54]. Kleeblad et al. reported a similar return-to-sport rate of 89.6% after approximately 4.4 months, which is sooner than Radhakrishnan et al. [54,55]. This difference may be due to Radhakrishnan et al.'s study comprising predominantly of conventional UKAs and Kleeblad et al.'s comprising of robotic-assisted UKAs. Furthermore, Kleeblad et al. reported patient satisfaction regarding their ability to resume sports of 82.1%, with 93.1% of patients aged >70 years old reporting satisfaction and 77.8% of patients aged <55 years old affirming satisfaction [55]. Although satisfaction rate differences between age groups were not significant, it suggests that patient satisfaction may be age-dependent, but more importantly, depends on patient expectations and needs.

Comparison between TKA and UKA demonstrated higher rates of return-to-sport, greater postoperative sport participation and increased physical activity levels in favor of UKA [7]. However, the time to return-to-sport was not significantly different between UKA and TKA (12 vs 13 weeks) [7]. This observation of increased physical activity in favor of UKA was also supported by Jassim et al. [56]. Prognostic factors affecting increased likelihood of return-to-sport include preoperative sports participation, younger age, male sex, and low body mass index [7].

In conclusion, approximately 80–90% of patients can expect to return to low-impact sports such as golf or yoga within one year following UKA. However, participation in moderate-impact sports such as running or volleyball following UKA may be safer than current guidelines imply as these guidelines are based primarily on TKA results and recent systematic reviews have demonstrated superior outcomes in favor of UKA [7,54]. Participation in high-impact sports remains discouraged as the risk of injury is high [51,52]. However, this should be evaluated case-by-case, as some patients may be eligible for higher-impact sports. This study advocated for an update of current guidelines on returnto-sport after UKA, as recent studies have suggested a more liberal counseling may be justified.

Return to work

In contrast to return-to-sport, universal guidelines for return to work are lacking. As UKA exhibits rapid postoperative rehabilitation, and increased postoperative activity levels, high return-to-work rates may be expected, resulting in reduction of costs for society. Patients and physicians commonly lack a clear perspective on the optimal time to return to work, and there is a lack of studies addressing return-to-work rates in UKA and its influential factors. More insight into factors affecting return-to-work is crucial, as a systematic review by Ng et al. reported that approximately 18% of patients did not return to work after UKA [57].

Kievit et al. compared return-to-work following UKA and TKA [58]. Seventy-five percent of UKA patients eventually returned to work. Notably, 27% of the patients who returned to work did so within 4 weeks, and the additional 73% returned within 3 months. In contrast, 72% of TKA patients returned to work. However, these patients required a significantly longer time to return-to-work, with 7% resuming work within 4 weeks and 49% returning within 3 months. Among patients who did not resume work, only 15% attributed it to their arthroplasty, with retirement being the predominant reason. Results indicate that the majority of patients can return to work at the same level of physical demand as preoperatively, with only 15% requiring a less physically demanding job [58].

A study by McGonagle et al. explored the factors influencing return-to-work after knee and hip arthroplasty [59]. Key factors for return to work included active recovery and physical therapy (61.2%), motivation (20.7%), and financial incentives (10.3%). Impediments to return to work included physical effects of surgery such as pain and fatigue (28.4%), reduced work capacity (22.4%), and physician recommendations (17.2%) [59].

In summary, most UKA patients can anticipate returning to work within three months. The chance of returning to work is increased with postoperative physical therapy, the motivation to return, and the financial incentive. Additionally, UKA patients can expect to return-to-work significantly sooner than TKA patients, although the eventual rate of work resumption is similar. Given the decreasing age of patients undergoing UKA, future research should focus on defining the optimal time to return-to-work and identifying contributing factors, to develop guidelines. Furthermore, the implementation of universal categories for the level of physical demand of work should be considered, as these significantly impact return-to-work rate and timing.

FUTURE PERSPECTIVES

The optimization of patient indications, combined with the integration of advanced technology in arthroplasty, may enhance outcomes. The data-driven nature of robotic-assisted surgery has reduced the potential for surgeon error and inter-surgeon variability. Additionally, the increased precision in robotic-assisted navigation may facilitate the implementation of novel personalized alignment techniques, which require tailored instrumentation and extensive preoperative planning. The prospect of implementing artificial intelligence into arthroplasty further emphasizes the importance of robotic-assisted surgery, as automatically collected data becomes essential.

It is important to recognize that the scope of improvement achievable through surgical adaptations alone is limited. The broader perspective, one that surgeons tend to, but should not overlook, concerns one of the most crucial factors influencing patient satisfaction. Neither bearing design nor fixation technique will predominantly determine patient satisfaction. Instead, the extent to which postoperative outcomes align with an individual patient's expectations is essential. To genuinely enhance patient satisfaction, it is increasingly apparent that our focus should not only revolve around the refinement of surgical techniques but also revolve around the optimal approach for addressing patient needs and expectations throughout the surgical treatment. Future research on UKA should therefore concentrate on two main objectives. Firstly, to continue refining surgical techniques with advanced technology and personalized alignment strategies and optimizing patient indications to tailor each knee to its optimal treatment, thereby reducing complication rates and improving implant survivorship. Secondly, equal emphasis should be placed on enhancing holistic patient-centric care during knee arthroplasty to improve subjective patient outcomes.

CONCLUSION

Numerous studies have consistently emphasized the effectiveness of the different types of UKAs as viable treatment options, characterized by minor differences in outcomes and implant survivorship. However, opinions remain divided on its superiority over TKA for the treatment of isolated compartment OA. Historically, orthopedic surgeons have struggled to determine the optimal patient indications for

UKA, which may have affected outcomes. Based on available literature, this study concluded that no universally significantly superior variant of UKA has been identified, instead being determined by a multitude of factors. Superior postoperative pain relief and return to sport and work may be observed during the first few months postoperatively in favor of UKA when comparing to TKA. Nevertheless, outcomes eventually converge and no significant differences in patient satisfaction are evident.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Andrew D. Pearle reports a relationship with Smith and Nephew Inc that includes: consulting or advisory. Hendrik A. Zuiderbaan reports a relationship with Smith and Nephew Inc that includes: consulting or advisory. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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