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*Corresponding author

Zia Maharaj, Arthroplasty Unit,
Orthopaedic Surgery Department,
Charlotte Maxeke Johannesburg
Academic Hospital, University of the
Witwatersrand, Johannesburg, South
Africa

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A Team Based Approach is Essential to Optimize Total Knee Arthroplasty Outcomes

Zia Maharaj* and Jurek Rafal Tomasz Pietrzak

Arthroplasty Unit, Orthopaedic Surgery Department, Charlotte Maxeke Johannesburg Academic Hospital, University of the Witwatersrand, South Africa

Abstract

Total Knee Arthroplasty (TKA) is the number one, most commonly performed orthopedic operation and remains a reliable, reproducible and cost-effective surgical procedure [1]. There is a high rate of overall patient satisfaction for TKA with a subsequent high demand that continues to rise [1]. Worldwide the average rate of annual Total Knee Arthroplasty (TKA) procedures performed has doubled between 2000 and 2016 [1]. There were approximately 100,000 TKAs respectively performed in the United Kingdom (UK) in 2018 [2]. There were 155,000 Total Knee Arthroplasty's (TKA) performed in the United States of America (USA) in 2018 with demand projected to increase to reach 1.26 million annual procedures by 2030 in the USA, alone [3,4]. Despite the popularity of this procedure, the average functional improvements following Total Knee Arthroplasty (TKA) are more modest than outcomes after Total Hip Arthroplasty (THA) [1]. The average gain in quality adjusted life years (QALYs) was 3.3 years and 4.3 years for TKA and THA, respectively [1]. These findings may be due to the longer recovery period for Total Knee Arthroplasty (TKA) compared to hip replacements, however it is evident that there may be a role for peri-operative rehabilitation to optimize these outcomes [1].

Return to Work and Return to Sports

Individuals younger than 60 years of age have shown a disproportionately increased demand for TKA compared to older demographic populations [5]. A younger population has increased post-operative expectations and a greater potential need to Return To Work (RTW). The rates of Return to Work (RTW) after Total Knee Arthroplasty (TKA) have been reported between 68-85% over a time ranging between 8-12 weeks post-operatively [6,7]. Return to sports (RTS) has been strongly associated with patient satisfaction after Total Knee Arthroplasty (TKA), particularly for former athletes [8]. Additionally, physically active individuals are prone to develop osteoarthritis at a younger age and subsequently present for TKA [8]. There is a wider variation of reported rates for RTS which varies between 34-100% and several factors have been demonstrated to impact this outcome [8].

The benefits of exercise for overall health are undeniable and it is important for the clinician to facilitate these goals. The American Heart Association (AHA) recommends that 20 minutes of aerobic physical activity three times per week can significantly improve physical and psychological health [9]. The AHA recommended guidelines have been demonstrated to decrease risk profile for cardiovascular health and premature mortality. The 2008 guidelines according to the Knee Society Survey recommends that minimal impact activities such as swimming, cycling and power walking should be recommended as safe after TKA, however consensus in changing [8,10]. Whilst there are no universal guidelines, pre-operative activity may be a predictor of post-operative functional outcomes. A long-term study of 236 TKA patients by Vielgut *et al.* [11] reported a significant improvement in pain and function after a mean follow-up of 14.9 years. Vielgut *et al.* [11] observed that patients who were physically active pre-operatively were able to continue high-impact activities [11].

Pre-Operative Optimization

Pre-operative work-op must include both patient assessment and counselling components. It is imperative to address post-operative expectations concerning RTW and specific physical limitations which may impede patients from achieving this goal. Psychological factors including self-motivation, an optimistic attitude and a social support system have had a positive effect on improving patient outcomes [12]. Extensive counselling is necessary to optimize these modifiable risk factors [6]. Assessment should include a thorough examination and documentation of the current level of activity and pre-operative function. There may be a role for pre-operative rehabilitation to aid improving medium-term outcomes [13]. A case-control study reported significantly improved functional outcomes at 6 months for patients who underwent a 6-week home-based exercise program prior to TKA compared to patients that did not [13]. Furthermore, a systematic review by Sharma *et al.* [14] found that patients who underwent pre-operative rehabilitation demonstrated a significantly decreased length of hospital stay after TKA [14].

Post-Operative Management

There are large variations between the types of rehabilitation programs used across institutions worldwide. After surgery, there is directed physiotherapy that can be implemented in an acute inpatient setting and outpatient exercise programs that begin after discharge [15-17]. There is no consensus on the optimal type, duration or frequency of exercise that will ensure the best outcomes for patients undergoing TKA [15, 16]. Partially due to the advances in surgery and management, the mean length of hospital stay after TKA has decreased between 2012 and 2018 from 2.3 days to 1.1 days [2]. Despite similar trends in surgeon experience and the improvement in surgical techniques between THA and TKA, functional outcomes after TKA is more modest than after THA [1]. The average adjusted mean changes between pre- and post-operative Oxford scale was 36% for TKA and 48% for THA, respectively [1]. The length of hospital stay after TKA rates continue to decrease worldwide however,



activity during the proceeding days after surgery may have a crucial impact on long-term outcomes [15, 16].

Inpatient Rehabilitation

Physiotherapy programs may be implemented during hospital stay in the acute post-operative phase [15]. A systematic review by Sattler et al. [15] identified four different physiotherapy interventions in the acute phase after TKA, namely Modified Quadriceps Setting, Flexion Splinting, Passive Flexion Ranging and Drop and Dangle Flexion [15]. The Modified Quadriceps Setting group demonstrated greater hamstring and gluteal muscle strength than the control group at the four-week follow-up [15]. However, there was no significant difference in functional outcomes across the four differing regimes after a follow-up at six weeks [15]. Further high-quality studies should be conducted to assess the impact of early rehabilitation after TKA over a longer follow-up period [15].

Outpatient Rehabilitation

After discharge, there are several rehabilitation programs that vary in content and duration [8, 16]. A systematic review by Artz *et al.* [16] including 18 studies for 1739 TKA patients assessed the differences in efficacy of various physiotherapy programs after TKA [16]. Even minimal physiotherapy has been shown to have improved outcomes up 6 months post-operatively when compared to a control group receiving no physiotherapy [16]. There are several adjuncts to physiotherapy programs including electrical stimulation, acupuncture, cryotherapy and various electrical modalities. [16] Patients should be educated on these forms of therapy as an adjunct to an exercise regime and offered on a personal preferential basis [8, 16]. However the adjuncts to physiotherapy cannot be used in isolation and should be implemented in conjunction with an exercise routine [16]. Various types of exercise such as hydrotherapy, cycling or additional balancing movements have shown equivocal outcomes when compared to conventional physiotherapy [16]. There are no significant differences in outcomes when outpatient physiotherapy was compared to a home-based exercise program [16]. Home-based exercise programs have shown a short-term benefit for range-of motion flexion, however the was no significantly improved function after a longer follow-up period [16].

After discharge even minimal physiotherapy has been shown to have improved outcomes up 6 months post-operatively when compared to a control group receiving no physiotherapy [15, 17]. There is no evidence to suggest which exercise modality produces the best outcomes and clinicians should consider patient motivation and preference when determining the most suitable exercise regime to recommend [16,17]. The variation in short-term results across interventions indicates that further high-quality studies should be conducted to assess the impact of early rehabilitation after TKA over a longer follow-up interval.

Conclusion

There is no evidence to suggest which exercise modality produces the best outcomes and clinicians should take patient motivation and preference into consideration [15-17]. Both pre-operative assessment and extensive patient counselling are vital to ensure optimal outcomes after TKA [6, 8, and 12]. Peri-operative rehabilitation programs should be recommended on an individualized basis after an assessment of baseline function, with the primary goal of meeting patient expectations [8, 15, and 16].

References

1. Organisation for Economic Co-operation and Development (OECD) (2019), Health at a Glance 2019: OECD Indicators, OECD Publishing, Paris.
2. NJR Editorial Board (2019) National Joint Registry 16th Annual Report 2019.
3. American Academy of Orthopaedic Surgeons, American Joint Replacement Registry (AJRR) (2018) Fifth AJRR Annual Report on Hip and Knee Arthroplasty Data.
4. Sloan M, Premkumar A, Sheth NP (2018) Projected Volume of Primary Total Joint Arthroplasty in the U.S., 2014 to 2030. *J Bone Joint Surg Am* 100: 1455-1460.
5. Kurtz S, Ong K, Lau E, Mowat F, Halpern M (2007) Projections of primary and revision hip and knee arthroplasty in the United States from 2005 to 2030. *J Bone Joint Surg Am* 89(4): 780-785.
6. van Zaanen Y, van Geenen RCI, Pahlplatz TMJ (2019) Three Out of Ten Working Patients Expect No Clinical Improvement of Their Ability to Perform Work-Related Knee-Demanding Activities After Total Knee

- Arthroplasty: A Multicenter Study. *J Occup Rehabil* 29: 585-594.
7. Tilbury C, Schaasberg W, Plevier JWM, Fiocco M, Nelissen RGHH, et al. (2014) Return to work after total hip and knee arthroplasty: a systematic review. *Rheumatology* 53(3): 512-525.
8. Barber Westin SD, Noyes FR (2016) Aerobic Physical Fitness and Recreational Sports Participation After Total Knee Arthroplasty: A Systematic Review. *Sports Health* 8(6): 553-560.
9. Garber CE, Blissmer B, Deschenes MR, et al. (2011) American College of Sports Medicine position stand. Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: guidance for prescribing exercise. *Med Sci Sports Exerc* 43: 1334-1359.
10. Healy WL, Sharma S, Schwartz B, Iorio R (2008) Athletic activity after total joint arthroplasty. *J Bone Joint Surg Am* 90: 2245-2252.
11. Vielgut I, Leitner L, Kastner N, Radl R, Leithner A, et al. (2016) Sports Activity after Low-contact stress Total Knee Arthroplasty-A long term follow-up study. *Sci Rep* 6: 24630.
12. McGonagle L, Convery Chan L, DeCruz P, et al. (2019) Factors influencing return to work after hip and knee arthroplasty. *J Orthop Traumatol* 20: 9.
13. Jahic D, Omerovic D, Tanovic AT, Dzankovic F, Campara MT (2018) The Effect of Prehabilitation on Postoperative Outcome in Patients Following Primary Total Knee Arthroplasty. *Med Arch* 72(6): 439-443.
14. Sharma R, Ardebili MA, Abdulla IN (2019) Does Rehabilitation before Total Knee Arthroplasty Benefit Postoperative Recovery? A Systematic Review. *Indian J Orthop* 53(1): 138-147.
15. Sattler LN, Hing WA, Vertullo CJ (2019) What is the evidence to support early supervised exercise therapy after primary total knee replacement? A systematic review and meta-analysis. *BMC Musculoskeletal Disorders* 20: 42.
16. Artz N, Elvers KT, Lowe CM, Sackley C, Jepson P, et al. (2015) Effectiveness of physical therapy exercise following total knee replacement: systematic review and meta-analysis. *BMC Musculoskelet Disord* 16: 15.
17. Castrodad IMD, Recai TM, Abraham MM, Etcheson JL, Mohamed NS, et al. (2019) Rehabilitation protocols following total knee arthroplasty: a review of study designs and outcome measures. *Ann Transl Med* 7: S255.