



QUESTION | WITH THE SNOW SEASON ALMOST UPON US WHAT IS THE RECOMMENDATION FOR SNOW SKIING POST TOTAL KNEE REPLACEMENT?

ANSWER | Total knee replacement (TKR) has been shown to provide predictable, long term pain relief and improved function in elderly patients with knee arthritis. There is a relative paucity of evidence for this in young, active patients participating in high impact sports. There are few structured, scientifically based recommendations regarding skiing after knee replacement despite increasing expectations from patients. Active patients enquire, more and more frequently, whether they will be able get back to high impact sports such as skiing after their operation.

There is also little consensus among joint-replacement surgeons regarding sports that should be allowed or recommended after the procedure [1]. Concerns have been raised that premature wear and aseptic loosening may occur in patients regularly participating in high impact sports such as certain types of skiing. The literature is inconclusive as to whether these concerns are justified.

High impact sport is loosely defined as an activity or sport characterized by intense and/or frequent wear and trauma of weight-bearing joints – foot, knee and hip [2]. Skiing involves a spectrum of impact magnitude depending on the patient's abilities, type of skiing and environmental conditions.

Knee Society survey recommendations regarding patient activity following TKR are not specific. Cross country skiing and indoor ski trainers are deemed acceptable [3]. Downhill skiing is more risky and no consensus has been reached regarding whether downhill skiing should be advised or not. It stands to reason that downhill skiers should avoid steep ungroomed runs and moguls and concentrate on well-groomed wide runs without icy conditions. High impact sports such as baseball, basketball, football, hockey, soccer, high-impact aerobics, gymnastics, jogging, power lifting, rock climbing, hang gliding, and parachuting are actively discouraged and classified as activities not recommended by the Knee Society [4].

Multiple studies have reported mid to long-term survivorship of 90% or higher for knee implants in patients who are less than 55 years of age [5,6,7]. Age may be a poor predictor of post operative level of activity and pedometer studies have demonstrated wide individual variability in activity level among patients of similar demographics [8].

Mont et al. reported on a cohort of 31 patients (33 knees) participating in high impact sports after TKA. Patient activity levels were defined using a previously published weighted activity scoring system, based on Knee Society definitions. Good or excellent midterm (mean of 4 years) outcomes were achieved by Knee Society scores and radiographic review. 3 of these patients were regular downhill skiers [9].

In another study, Mont et al [10] reported similar clinical outcomes in matched high and low-activity cohorts each with 57 patients (72 knees). At a mean follow-up of 7 years (range, 4-14 years) the mean Knee Society scores were 95 points (range, 70-100 points) and 96 points (range, 80-100 points) for the high-activity and low-activity groups, respectively. In areas including functionality and independence in their personal and social activities, the high-activity patients reported better scores than the low-activity patients with mean scores of 9.7 vs. 8.9 points ($P = .035$) and 9.4 vs. 8.6 points ($P = .027$), respectively.

In a study of 1266 patients reporting their activity levels following primary TKR, categorized by UCLA activity level ratings, approximately 5% participated in skiing at a mean of 5.2 years after surgery. 16% (187/1266 patients) reported participating in heavy manual labour or sports deemed “not recommended” in the published Knee Society survey. This group of patients participating in not recommended activities had higher average UCLA scores, higher Knee Society pain scores (less pain), higher modified Knee Society function scores and higher activity level vs. peers than the remainder of those surveyed [11].

In a surveyed population of 2085 respondents (postal questionnaire) in the UK only about 30% got back to sports (most commonly swimming, walking and golf) from about 61% of the respondents who were active in sports in the 3 years prior to replacement [12]. This percentage is likely to be higher in Australian patients who may have a higher level of activity preoperatively and may not be a comparable population in reporting outcomes [13]. In a retrospective review of 160 Australian patients (208 knees) TKR recipients were more likely to return to low-impact activities such as bowls (29 of 32, or 91%) than to high-impact activities such as tennis (6 of 30, or 20% returned). Forty-three of 56 patients (77%) who had participated in regular exercise in the year before surgery returned to sports [14].

In an interesting study [15], the in vivo forces in TKR articulating surfaces were quantified using data from 3 patients implanted with instrumented tibial prostheses. As expected, stationary bicycling generated low tibial forces, whereas jogging and tennis generated high peak forces (approximately 3 times greater). Notably, the golf swing generated unexpectedly high forces, especially in the leading knee.

Peak contact and shear forces would be expected to be greater in patients participating in high impact sports, particularly those activities that involve cutting and pivoting. In femoral components, with dual radii of curvature, the conformity is less and point contact stresses are higher in flexion than in extension and therefore downhill skiing, in a relatively flexed posture, would subject the knee to greater wear. A relatively extended posture and flatter runs, such as that achieved in cross country skiing would be more desirable.

Furthermore, joint loads might be significantly increased for beginner skiers compared with experienced individuals. For example, knee joint loads during skiing were estimated for skilled and untrained skiers. [16] It was found that the knee joint forces in the steering phase were not very high for highly skilled skiers (2775N). However, unskilled skiers tended to lean backwards and their knee joint forces increased heavily to 7463N. They further concluded that in icy snow conditions and in moguls the knee forces in low-level skiers might reach very high values.

It is intuitive to surgeons to give individualized, specific advice regarding participation in high impact sport based on individual circumstances [17]. Despite advice to the contrary regarding participation in high impact sports, a small percentage of patients will partake regardless. Skiing should not be discouraged following TKR and those who partake in sports postoperatively have the most to gain in their reported outcomes. Patients should be made aware of the mechanisms of wear and the types of skiing that may lead to premature failure of their TKR.

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