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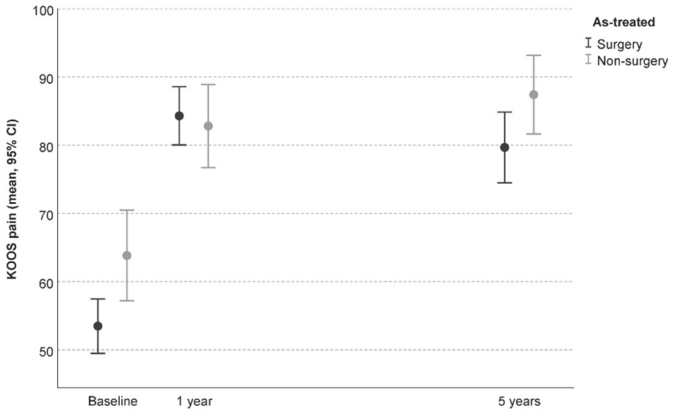

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FUNCTIONING OF PATIENTS WITH A PRIMARY TOTAL KNEE REPLACEMENT EXPLORED IN THE LIGHT OF ASYMPTOMATIC PEERS

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Purpose: While improvement of physical recovery after total knee arthroplasty is often subject to research, little is known how patients with a primary total knee replacement (TKR) function compared to asymptomatic age-matched controls. Moreover, there is no clear overview of the percentage of patients experiencing functional deficits and the type of activities showing these limitations. Therefore, the aim of this study is to investigate the problem of poor physical functioning in patients with a TKR.

Methods: The patient cohort (N=36), aged 50-75 years old, had their primary TKR 1-5 years ago in the Netherlands, without revisions or other complications reported. They filled out two questionnaires on physical functioning: Knee injury and Osteoarthritis Outcome Score - Physical Function Short Form (KOOS-PS) and the Oxford Knee Score (OKS) functional component scores. The KOOS-PS scores of the TKR patients were compared to the KOOS-PS scores of asymptomatic controls. This control data (N=179) were collected by the Musculoskeletal Institute, in persons accompanying patients who came in for consultation in the hospital Pierre Paul Riquet, Toulouse, France. Inclusion criteria were 50-75 years old and no known lower limb ailment (Marot et al. 2018). Informed consent was provided by all participants. Primarily, the incidence of patients with poor physical functioning was calculated. Poor physical functioning is defined as a total score on the KOOS-PS lower than 75% of the total scores on the KOOS-PS from the asymptomatic controls. Secondary, the experienced difficulty on individual activities in patients from both the questionnaires were analyzed. Activities in the questionnaires were rated with a score of 0 (extreme difficulty/ impossible) to 4 (no difficulty). The percentage of patients scoring poor on these activities was calculated, defined by a difficulty score of 0 or 1.

Results: TKR patients scored a median total score on the KOOS-PS of 66.4 (Interquartile Range (IQR) 56.0 - 89.5) and a median total score on the OKS of 85.0 (IQR 75.0 - 96.3). Asymptomatic controls scored a median total score on the KOOS-PS of 94.4 (IQR 75.1 - 100). TKR patients scored significantly lower on the KOOS-PS compared to the controls (Mann-Whitney $U = 1701$, $p < 0.001$ two-tailed). More than half of the TKR patients (56 percent) scored poor physical functioning on the KOOS-PS. Reviewing scores on the individual activities in the questionnaires shows worst scores for squatting and kneeling, followed by twisting on the injured knee (Table 1 & 2). Almost 50% of patients experience kneeling and squatting as severely or extremely difficult to perform. Interestingly, kneeling was rated as more difficult on the KOOS-PS than on the OKS, while scored by the same patients. Furthermore, the median total score on the OKS was higher (more towards no difficulty) than the median total score on the KOOS-PS. In the KOOS-PS the scores 1 and 0correspond to severe or extreme difficulty respectively, while in the OKS they correspond to extreme difficulty and impossible to kneel. In both the KOOS-PS and OKS a score of 2 corresponds to moderate difficulty.

Conclusions: More than half of TKR patients experience their physical functioning as poor compared to asymptomatic controls. Interestingly, while the OKS shows less of a floor effect, allowing activities to be impossible, the KOOS-PS may be a better tool in identifying poor functioning in this patient group. This can be explained by the greater nuance in the degree of difficulty that can be expressed in the KOOS-PS. The functional activities that mainly cause poorer functioning in the TKR patients are kneeling and squatting, followed by twisting or pivoting on the injured knee. Kneeling and squatting are challenging movements during which the full bodyweight is carried under a large moment arm on the knee, while performing a movement that requires refined coordination of motor control. While strength training is part of standard rehabilitation after knee replacement surgery, the motor control is not. It is possible that patients need to retrain the coordination of their movements when symptoms subside and the biomechanical environment of the knee has changed. Comparison of total scores on the KOOS-PS and OKS of our study with the literature, shows a comparable sample median but a larger IQR. To increase power and a more representable IQR, especially on individual items, we aim to include a larger patient dataset. The question arises whether we should aim to train patients up to a level of functioning similar to asymptomatic peers. Future research may calculate the patient-acceptable symptom state (PASS) for physical functioning, to consider the patients need for functioning.

Table 1 KOOS-PS scores per item for controls (Asymp) and patients (TKR), %poor functioning patients

KOOS-PS items	Asymp(Median (IQR))	TKR(Median (IQR))	% TKR with low scores (0 or 1)
Rising from bed	4 (4 - 4)	4 (2 - 4)	17.0
Putting on socks/ stockings	4 (4 - 4)	3 (2 - 4)	5.6
Rising from sitting	4 (3 - 4)	3.5 (2 - 4)	11.0
Bending to floor	4 (3 - 4)	3 (2 - 4)	14.0
Twisting/pivoting on your knee	4 (3 - 4)	3 (1 - 4)	28.0
Kneeling	4 (3 - 4)	2 (1.75 - 4)	47.0
Squatting	4 (2 - 4)	2 (0 - 3)	44.0

Table 2 OKS function scores per item for TKR patients (TKR) and % poor functioning patients

OKS items	TKR(Median (IQR))	% TKR with low scores (0 or 1)
Washing and drying yourself	4 (3.75 - 4)	2.7
Using car or public transport	3 (3 - 4)	2.7
Kneeling	2 (1.75 - 4)	24.0
Household shopping	4 (3.75 - 4)	8.1
Going downstairs	4 (3 - 4)	8.1