Appendix E:

Patient and public involvement

As part of the patient involvement process, four patients—two females and two males with an average age of 65 years—were recruited from a regular outpatient clinic visit. A senior orthopedic surgeon consulted these patients to gather insights on trial protocols and their perceptions of surgical outcomes and rehabilitation. Patients were asked two primary questions: (1) "What do you consider to be a good outcome from surgery, and what would you consider a poor outcome?" and (2) "What do you feel would be a suitable way to monitor your rehabilitation, and what aspects of rehabilitation do you consider most important?"

For the first question, the majority of patients identified painless movement as the primary indicator of a successful surgical outcome. However, three-quarters of the respondents also expressed a strong desire for improved knee flexion, despite having a near-normal range of motion when clinically assessed. This unexpected emphasis on enhanced range of motion highlighted the importance of patient-perceived functional outcomes, which turned out to be more significant to the patients than initially anticipated by the orthopedic surgeon.

For the second question, patients overwhelmingly preferred rehabilitation monitoring to be conducted by a physiotherapist who could provide direct oversight and guidance throughout the process. Notably, none of the respondents mentioned electronic devices or digital tools as potential means of monitoring.

Data Monitoring Committee

The Data Monitoring Committee (DMC) consists of Dr. Juuso Heikkinen (MD, PhD) from Oulu University Hospital, Dr. Teemu Karjalainen (MD, PhD) from Hospital Nova, and Dr. Lasse Rämö (MD, PhD) from HUS (Helsinki University Hospital). They are independent from the sponsor and have no competing interests.

Daily sedentary time

The Oura Ring is a commercial wearable device that uses acceleration data, photoplethysmogram (PPG) signal and body temperature data to measure daily physical activity, night-time sleep duration and also estimates sleep stages. The ring is light (4-6 g depending on the ring size), and easy to use for continuous monitoring. Its battery can support 5-7 consecutive days of monitoring with one battery charge.¹ The ring is connected to the Android or iOS Oura mobile app via Bluetooth. The data

are automatically sent to the mobile app and transferred to the cloud server. The data can be accessed through the mobile app or the server. In this study, we extracted the data from the Oura cloud. Daily sedentary time, or inactive time, is based on the data gathered by the 3D accelerometer of the ring. Sedentary time presents the time which patient spend sitting, standing or otherwise being passive with metabolic equivalent (METs) range from 1 to 1.5.²

Daily physical activity

Daily physical activity is based on the data gathered by the 3D accelerometer of Oura ring. The ring measures the movement of hand to estimate whole-body activity (physical activity) and leg movement (step count). To estimate step count, the number of movements detected by Oura Ring is multiplied by a number that represents the degree and type of physical activity during the day, aiming to translate the movement into a step count that accurately depicts intensity and regularity. According to Oura, the daily margin of error for step count is similar to those of other wearables that measure step count via GPS or rough approximations using gender, weight, age, and height.²

The physical activity outcome measures used in this trial are the daily energy expenditure reported as METs and the walking equivalency. Oura ring estimates the daily energy expenditure based on step count value. Walking equivalency states how many kilometers the ring user should have walked to use that amount of energy.²

Quality of sleep

In this trial, the quality of sleep will be measured with Oura ring. The outcome measures of the sleep quality are the nocturnal HR and HRV and the total sleep time. The Oura ring has been shown to have high validity in the assessment of nocturnal HR and HRV in healthy adults.¹ The sleep metrics of Oura ring have been validated in a sleep laboratory setting by Zambotti et al.³ The Oura ring showed good agreement with polysomnography (PSG) in the whole night estimation of total sleep time in group of healthy adolescents and young adults.³

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