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FIELD OF VISION

Multi-factorial sustainability approach is necessary to preserve knee function following osteoarthritis diagnosis

John Nyland, Roland Jakob

John Nyland, Division of Sports Medicine, Department of Orthopaedic Surgery, University of Louisville, Louisville, KY 40202, United States
Roland Jakob, Orthopaedic Surgery, Hopital Cantonal, CH-1701 Fribourg, Switzerland
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Correspondence to: John Nyland, EdD, DPT, Division of Sports Medicine, Department of Orthopaedic Surgery, University of Louisville, 550 S. Jackson St., Louisville, KY 40202, United States. john.nyland@louisville.edu
Telephone: +1-502-8522782 Fax: +1-502-8527227
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Abstract

Knee function preservation following a diagnosis of osteoarthritis may benefit from healthy patient lifestyles, exercise or activity habits, and daily living routines. Underlying societal issues and social roles may contribute further to both ecological and knee function preservation concerns. Based on sustainability theory and social ecology concepts we propose that factors such as health history, genetic predisposition, socio-environmental factors and local-regional-global physiological system viability contribute to knee function preservation. Addressing only some of these factors or any one factor in isolation can lead the treating physician, surgeon and rehabilitation clinician to less than optimal treatment effectiveness. An example is presented of a 57-year-old man with medial tibiofemoral osteoarthritis. In the intervention decision-making process several factors are important. Patients who would benefit from early knee arthroplasty tend to place osteoarthritic knee pain elimination at the top of their list of treatment expectations. They also have minimal or no desire to continue impact sport, recreational or vocational activities. In contrast, patients who are good candidates for a knee function preservation treatment approach tend to have greater expectations to be able to continue impact sport, recreational or vocational activities, are willing and better able to implement significant behavioral changes and develop the support systems needed for their maintenance, are willing to tolerate and live with minor-to-moderate intermittent knee pain, and learn to become more pain tolerant.

Key words: Knee surgery; Treatment planning; Comprehensive care

Core tip: Total knee arthroplasty likely provides the best chance for knee osteoarthritic pain elimination. What is less understood by the patient is the needed reduction in recreational sport or vocational activities that will likely follow this intervention and the negative impact that elimination of these activities will potentially have on local-regional-global physiological systems, psychosocial factors, and quality of life. Patient satisfaction regarding the selection of either early knee arthroplasty or knee joint preservation is largely based on their expectations and the likelihood that these expectations are realistic.

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INTRODUCTION

To sustain natural systems there must be an ongoing balance between environmental, social, and economic considerations[1]. A key element of sustainability theory is to identify the most vulnerable component. In the knee, ar-

ticular cartilage, which has a poor healing capacity is the last line of defense from osteoarthritis (OA). Environmental sustainability benefits through the development of nature friendly cities, gardens, and parks. Knee function preservation may similarly benefit from healthy lifestyles, exercise or activity habits, and daily living routines. Underlying societal issues and social roles may contribute further to both ecological and knee function preservation concerns. Based on sustainability theory and social ecology concepts we propose that factors such as health history, genetic predisposition, socio-environmental factors and local-regional-global physiological system viability contribute to knee function preservation[2,3]. Addressing only some of these factors or any one factor in isolation can lead the treating physician, surgeon and rehabilitation clinician to less than optimal treatment effectiveness.

As an example we present a 57-year-old man with medial tibiofemoral compartment knee pain who displays a 33% reduction in articular cartilage thickness on standing, weightbearing radiographs. He has a strong desire to continue recreational soccer and tennis with his club teams. On a 10-cm visual analog scale he rates his medial knee pain with walking as 3-5, using up his pain medication prescription in approximately 3 mo. He considers himself to be 10 kg overweight [body mass index (BMI) = 29] and is interested in reducing his bodyweight. Intervention now with high tibial osteotomy and an individualized therapeutic exercise program[4-7] that makes appropriate use of social cognitive theory principles[8] to effect needed behavioral changes would greatly enhance this patient's likelihood for continuing recreational soccer and tennis participation. Without this needed intervention, by the time he is 60-years of age his condition may have progressed to two or more knee compartments and his bodyweight may have increased another 10 kg (BMI = 32) leading his treating orthopaedist to recommend total knee arthroplasty.

Total knee arthroplasty likely provides the best chance for knee OA pain elimination[9-11]. What is less understood by the patient is the needed reduction in recreational sport or vocational activities that will likely follow this intervention and the negative impact that elimination of these activities[12,13] will have on local-regional-global physiological systems, psychosocial factors, and lifestyle. Assuming a life expectancy of 85 years of age; the next 25 years following TKA will likely include reduced medial right knee pain, but also reduced participation in social roles and responsibilities that have largely contributed to his being the person that he is, thereby decreasing quality of life. In contrast, early intervention with high tibial osteotomy[14], weight loss, and behavioral change-inducing individualized therapeutic exercises with a social cognitive theory approach[8,15] when he was 57 years of age may have been sufficient to enable him to continue recreational soccer and tennis participation. Simultaneously this intervention may have served as the conduit to effecting both physiological and psychosocial benefits, improved coping skills, self-efficacy and stress resilience levels, and the maintenance of decision-making independence regarding the activities he chooses to perform, as well as the frequency and intensity of those activities. Maintenance of cognitive as well as functional independence is essential to healthy aging and early knee OA treatment intervention including a less invasive surgical procedure has the potential to serve as the needed conduit to improved general health and needed psychobehavioral changes in addition to knee function preservation. The key ingredient in this decision-making process is the patient's willingness and ability to comply with the necessary lifestyle changes and with an individualized therapeutic exercise program that relies on social cognitive theory approach concepts of modeling, self-efficacy development, reciprocal determinism between patient and environment, and vicarious learning to effect positive behavioral changes that improve physical and emotional health, general health, and preserve knee function.

In the decision-making process to direct the patient to the best clinical care pathway several factors are important. Patients who would benefit most from early knee arthroplasty tend to place knee OA pain elimination at the top of their list of treatment expectations. They also have minimal or no desire to continue impact sport, recreational or vocational activities. They are less likely to be willing or be able to make significant changes to existing negative health behaviors such as excessive bodyweight[13] or smoking. Finally, before selecting this pathway they should understand that this intervention was designed primarily for elderly patients and it is that population that appears to be the most satisfied with that treatment approach[11,16-18]. However, the knee function expectations of that group are not very high[11]. In contrast, patients who are good candidates for a knee function preservation approach such as meniscal repair, meniscal transplantation, chondroplasty, or osteotomy[19] tend to have greater expectations to be able to continue impact sport, recreational or vocational activities. They also tend to be more willing and better able to implement significant behavioral changes, to develop the support systems needed for their maintenance, are willing to tolerate and live with minor-to-moderate intermittent knee pain and are willing to learn to become more pain tolerant. Satisfaction regarding the selection of either clinical care pathway is largely based on patient expectations and the likelihood that these expectations are realistic[2,3,11]. Patients should understand that the knee function preservation clinical care pathway was designed for young or middle-aged patients who have the capacity for commitment, implementing, and achieving the needed behavioral changes. In the battle against knee OA treating clinicians are trying to preserve knee function. Selecting a salvage procedure such as knee arthroplasty too early in the disease progression before completely understanding patient expectations[20] may lead to less than optimal treatment effectiveness. This is particularly

true for more active patients who are willing to live with intermittent knee pain to be able to continue impact activities deemed to be of high quality of life value.

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