The Effect of Knee Replacement on Participation Restrictions: The Multicenter Osteoarthritis Study


Epidemiology: Arthritis

- 50 million people self-report some type of arthritis condition
  - ~ 50% limited in at least one daily activity (walking, climbing stairs, opening a jar)
  - ~ 20% unable to walk ¼ mile

- A leading cause of disability among adults

Arthritis: What is it?

A term that refers to over 100 different conditions.

Typically involve inflammation and pain at joints, muscles, tendons and other body systems.

Arthritis: Common Types

- Osteoarthritis
- Gout
- Rheumatoid arthritis
- Psoriatic arthritis
Osteoarthritis (OA)

- 27 million adults
- Degenerative joint disease
  - Pain, muscle weakness
- OA is a major cause of activity limitations and activity of daily living restrictions
- Joint replacement surgery used for end stage disease

Background: Total Knee Joint Replacement (TKR) Surgery

- TKR rates are skyrocketing
- Over 3.5 million TKR to be performed annually by 2030 (Kurtz et al. J Bone Joint Surg Am. 2007)
Background: TKR Costs

- Projected annual costs of $49 billion by 2015\textsuperscript{1}
- JAMA (2012): Need for increased study and tracking of health outcomes of knee replacement\textsuperscript{2}

\textsuperscript{1}Kim, 2008; \textsuperscript{2}Slowver et al. 2012

Background: TKR Outcomes

- 20-30\% of patients s/p TKR have long-term chronic pain and functional limitations
- Participation outcomes not clear

Participation Outcomes

- How many people have participation restriction after TKR?
- Does TKR improve participation?
Purpose

1) To examine participation restriction before and after TKR. *(How many people have participation restriction after TKR?)*

2) To examine whether the percentage of participation restriction differs among participants status-post TKR compared to matched study participants who did not have TKR. *(Does TKR improve participation?)*

Methods

- The Multicenter Osteoarthritis Study (MOST)
  - Longitudinal cohort study (N=3026) adults with or at risk of developing symptomatic knee OA
  - Age 50-79 at baseline
  - Iowa City, IA and Birmingham, AL clinic sites
  - Enrolled 2003 to 2005
  - Study visits occurred at baseline, 30-, 60- and 84-months
Methods: Study Eligibility

- Participation measured prior to TKR and at least 12 months after surgery date

Sample: Participation Restrictions Pre- and Post-TKR

MOST Participants (N=3026)

Pre-TKR (N=218) → Post-TKR (N=218)
Sample: Comparing Participation among those with TKR vs. those without TKR

MOST Participant (N=3026)

TKR Participants (N=237)
Non-TKR group (N=237) matched on demographics, disease severity, impairments, function, and participation

Methods: Variables

- **Outcome:**
  - Participation measured using Late Life Disability Instrumental Limitation Subscale (LLDI-IL)
  - Participation restriction defined < 69/100 LLDI-IL¹

- **Independent variable:** TKR

- **Covariates used to create sample similar to TKR group:**
  - Age, sex, ethnicity, comorbidity, body mass index, knee pain, depressive symptoms, function, participation

Late-Life Disability Instrument: Instrumental Subscale (LLDI:IL)

### Limitation in Instrumental Activities (Scale 10 items; score 0-100)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Not at all</th>
<th>A little</th>
<th>Somewhat</th>
<th>A lot</th>
<th>Completely</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taking care of local errands</td>
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<tr>
<td>Going out with others to public places like restaurants</td>
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<tr>
<td>Taking part in active recreation</td>
<td></td>
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<tr>
<td>Taking part in organized social activities</td>
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<tr>
<td>Taking part in a regular fitness program</td>
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</tbody>
</table>

Jette et al. (2001). *Journals of Gerontology: Medical Science*

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Methods: Statistical Analysis

- Percent of participation restrictions calculated

- Logistic regression to assess the effect of TKR on participation restriction among persons obtaining TKR compared to a similar participant (matched) group
% Participation Restrictions Pre- and Post TKR

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Pre-knee replacement (n=218)</th>
<th>At least 1 year post-knee replacement (n=218)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>37</td>
<td>31</td>
</tr>
<tr>
<td>Sex: Women</td>
<td>39</td>
<td>32</td>
</tr>
<tr>
<td>Men</td>
<td>32</td>
<td>25</td>
</tr>
<tr>
<td>Race: White</td>
<td>33</td>
<td>28</td>
</tr>
<tr>
<td>Other</td>
<td>62</td>
<td>41</td>
</tr>
<tr>
<td>Age at knee replacement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;65 years</td>
<td>46</td>
<td>29*</td>
</tr>
<tr>
<td>65-74 years</td>
<td>33</td>
<td>30</td>
</tr>
<tr>
<td>75+ years</td>
<td>24</td>
<td>44</td>
</tr>
</tbody>
</table>

* p<=.05

Results: TKR vs. Non-TKR Demographics

<table>
<thead>
<tr>
<th>Variable</th>
<th>TKR participants (n=237)</th>
<th>Non-TKR participants (n=237)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years, mean (SD)</td>
<td>68 (7.8)</td>
<td>67.7 (7.9)</td>
</tr>
<tr>
<td>% Female</td>
<td>68</td>
<td>70</td>
</tr>
<tr>
<td>% White</td>
<td>88</td>
<td>87</td>
</tr>
<tr>
<td>BMI, kg/m², mean (SD)</td>
<td>32.1 (6.6)</td>
<td>32.2 (6.5)</td>
</tr>
<tr>
<td>Depressive score, range 0-16, mean (SD)</td>
<td>7.7 (6.8)</td>
<td>8.8 (9.1)</td>
</tr>
<tr>
<td>% with 1+ comorbidity</td>
<td>82</td>
<td>85</td>
</tr>
<tr>
<td>Knee pain, range 0-20, mean (SD)</td>
<td>7.3 (3.6)</td>
<td>7.3 (3.8)</td>
</tr>
<tr>
<td>% with Participation Restrictions</td>
<td>34</td>
<td>35</td>
</tr>
<tr>
<td>WOMAC Function, mean (SD)</td>
<td>26.1 (10.9)</td>
<td>27.1 (12.1)</td>
</tr>
</tbody>
</table>
Percent of Participants with Participation Restrictions At Least 1 Year After Surgery

<table>
<thead>
<tr>
<th></th>
<th>TKR Participants (N=237)</th>
<th>Non-TKR Participants (237)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number (%) with Participation Restrictions</td>
<td>92 (39%)</td>
<td>95 (40%)</td>
</tr>
<tr>
<td>Association between TKR status and participation restrictions</td>
<td>1.0, (95% CI 0.6, 1.7)</td>
<td>Reference</td>
</tr>
</tbody>
</table>

Results: Summary

- Participation restriction high in both samples
- Persons less than age 65 seem to have the greatest improvement in participation restriction
- Compared with non-TKR group, TKR does not lower the odds of having participation restriction
Limitations

- Time from pre-TKR assessment to post-TKR assessment differed across subjects
- Pain, function, participation restrictions not assessed immediate prior to surgery
- Non-TKR ‘matched’ group was high severity group that might be biased
- Other confounding factors not included (e.g., health insurance, financial resources, willingness to undergo TKR)

Conclusion

- Participation restriction is prevalent pre and post TKR
- TKR may have limited if any impact on participation outcomes
- Additional approaches other than TKR may need to be implemented to improve participation outcomes among persons with knee OA
Acknowledgements

- NIDRR PR/Award #H133B100003
- MCRC NIH/NIAMS: AR47785
- NIH/NIA grants for MOST: AG18947, AG188832, AG19069, AG18820
- MOST investigators, staff and participants

- MOST Online description of data available: http://most.ucsf.edu
- Steps to obtaining MOST data: http://most.ucsf.edu/steps.asp
- Information or questions on how to request data: MOSTOnline@psg.ucsf.edu
- Collaboration with MOST investigators: http://most.ucsf.edu/contact.asp

Thank you!
Questions and Comments!

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NIDRR PR/Award #H133B100003
Promoting Activity and Participation among Persons with Arthritis

The NIDRR Arthritis State of the Science Meeting

April 6-7, 2014
Ritz-Carlton, Pentagon City