Using a Bundle Prophylactic Approach in Post-Operative Total Knee and Total Hip Arthroplasty Patients

Haofei Wang, DNP, RN, NEA-BC, and Patrick Ryan, MS, RN,CNS, NP-C, CCRN

Background

- Total knee (TKA) and total hip arthroplasties (THA) are the results of advanced osteoarthritis from the cumulative degeneration at the cellular and organ level.¹
- It is projected there will be more than 3 million TKA and close to 1.4 million THA procedures in the US in 2030 compared to 1.2 million and 658,305, respectively, in 2015.²
- Post-operative venous thromboembolism (VTE) is a serious but preventable complication associated with longer hospital LOS, and increased mortality.³
- Patients who undergo TKA and THA are at the highest risk for post-operative VTE complication due to direct vessel trauma, venous stasis, and prolonged immobilization.⁴
- Evidence is limited on which prophylactic intervention(s) to prevent post-operative VTE is/are optimal or suboptimal for TKA and THA patients.

Objectives

- Investigate different types of VTE prophylaxis (mechanical and pharmacological) in relation to VTE incidence.
- Investigate different pharmacological prophylactic interventions (anti-coagulant and non-anti-coagulant) in relation to VTE incidence.
- Investigate different mechanical prophylactic interventions (sequential compression device and early mobilization) in relation to VTE incidence.
- Investigate patient age, BMI, gender, and type of surgery in relation to VTE incidence.

Methods

STUDY DESIGN: Retrospective study design
SETTING: NewYork-Presbyterian/Columbia University Medical Center
SAMPLE: 135 patients (≥ 18 years of age) had primary TKA or THA between October 2015 and December 2015 (Table 1).

Table 1. Sample Characteristics

<table>
<thead>
<tr>
<th>Surgery Type</th>
<th>Sample Size</th>
<th>%</th>
</tr>
</thead>
</table>
| Hip          | 86          | 66.6%
| Total        | 135         | 100%

Table 2. Patient Age and BMI Using t-test

<table>
<thead>
<tr>
<th>Age (avg. in years)</th>
<th>Anti-coagulant</th>
<th>Non-anti-coagulant</th>
<th>t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.D.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>36.5 ± 7.10</td>
<td>29.88 ± 6.32</td>
<td>.53</td>
</tr>
</tbody>
</table>

Note: **p < .001, ***p < .05

Table 2. Patient Age and BMI Using t-test

<table>
<thead>
<tr>
<th>Age (avg. in years)</th>
<th>Sequential Compression</th>
<th>Device + Early Mobilization</th>
<th>t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.D.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>31.31 ± 7.68</td>
<td>29.82 ± 5.78</td>
<td>1.35</td>
</tr>
</tbody>
</table>

Note: *p < .05

Table 2. Patient Age and BMI Using t-test

<table>
<thead>
<tr>
<th>Age (avg. in years)</th>
<th>tKA</th>
<th>TRA</th>
<th>TKA</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.D.</td>
<td>7.96</td>
<td>3.66</td>
<td>3.54</td>
</tr>
</tbody>
</table>

Note: *p < .05

Results

- None of the patients developed post-operative VTE (DVT or PE) between October 2015 and December 2015.
- All patients received a bundle prophylactic approach (both pharmacological and mechanical) except for three patients were on pharmacological treatment only.

Figure 1. Bundle prophylactic approach

- Majority of the patients were on either Rivaroxaban (anti-coagulant) or ASA (non-anti-coagulant) (Figure 2).
- 34% of patients received sequential compression device only, and 63% of patients received both sequential compression device and early mobilization therapy within 24 hours of surgery (Figure 3).

Figure 2. Pharmacological

- Common patient characteristics revealed: TKA patients were older and more overweight than THA patients on average; and majority of patients were female for both surgery types.

Figure 3. Mechanical

Conclusions

- The use of a bundle prophylactic approach, both mechanical intervention(s) and pharmacological prophylaxis, is effective in preventing the likelihood of VTE development in post-TKA and -THA patients.
- Future clinical trials of VTE prophylactic interventions involving different types of pharmacological and mechanical approach for TKA and THA population, and evaluation of the relative risks and benefits of these interventions are needed.
- Future emphasis should focus on strategies to improve guideline adherence and practice compliance in order to effectively prevent VTE.
- Policymakers and health care professionals need to focus more on preventative measures at the population level in order to control the rapid growth in demands, therefore, the overall health care expenditure.

Acknowledgments

Sincerely thank the IRB of Columbia University Medical Center and George Washington University, and following people who are the integral part of this research project:

Kevin D. Masick, PhD
Majeda El-Banna, PhD, RN
Reynaldo Rivera, DNP, RN, NEA-BC, FAAN
Steven Sheingold, PhD
Brenda H. Sheingold, PhD, RN
Kate Driscoll-Mallaharis, PhD, NP-C, MAAC, FAAN

References: