Pre-operative Lumbar Plexus Block Provides Superior Post-operative Analgesia when compared with Fascia Iliaca Block or General Anesthesia alone in Hip Arthroscopy

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I have the following financial relationships to disclose:

- Consultant: Stryker
Background and Rationale

• Optimal anesthesia for arthroscopic surgery of the hip has yet to be defined
Background and Rationale

• Considerations specific to hip arthroscopy include:
  
  o Control of intra-operative pain
  
  o Adequate muscle relaxation to allow for distraction for work in the central compartment
  
  o Post-operative pain control
Background and Rationale

• We sought to compare general anesthesia alone to general anesthesia preceded by 2 different nerve blocks:
  
  o Fascia Iliaca block
  
  o Lumbar Plexus Block
Hip Innervation

- The hip joint is innervated by the femoral nerve, obturator nerve, the sacral plexus via the nerve to the quadratus femoris, and at times, directly via the sciatic nerve.¹
• The anterior portion of the hip joint is innervated by the Femoral and Obturator Nerves

• The anterolateral thigh is innervated by the Lateral Femoral Cutaneous Nerve
• The posterior portion of the hip joint is innervated by the:

  • Nerve to the Quadratus Femoris
  • The Superior Gluteal Nerve
  • Directly via the Sciatic Nerve
Lumbar Plexus Blockade Reduces Pain After Hip Arthroscopy: A Prospective Randomized Controlled Trial
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• Compared Spinal Epidural to Spinal Epidural plus lumbar plexus block

• Statistically significant decrease in PACU pain scores (-0.9 on 0-10 scale)
• Significantly lower pain up to 6 hours post-operatively
• 6 of 27 patients in the femoral nerve block group reported falls in the first 24 hours post-operatively
Fascia Iliaca Block

• Provides Femoral and Lateral Femoral Cutaneous Nerve blockade

Lumbar Plexus Block

- Provides Femoral, Lateral Femoral Cutaneous, and Obturator nerve blockade

Image from [www.jaaos.org](http://www.jaaos.org) accessed 9/9/15
Materials and Methods

• Retrospective chart review
• 145 consecutive patients who underwent arthroscopic hip surgery
• Single surgeon
• Single ambulatory surgery center
• Three anesthesiologists
**Materials and Methods**

- Anesthesiologists performed all pre-operative fascia iliaca blocks under ultrasound.
- Goal is a medial to lateral spread of local anesthetic underneath the fascia iliaca.

Materials and Methods

• Anesthesiologist performed all pre-operative lumbar plexus blocks under ultrasound.

• Goal is dispersion of anesthetic in a fascial plane within the psoas muscle where plexus roots are situated.

Materials and Methods

- The local anesthetic used for both techniques was 40 mL 0.2% Ropivacaine with 4 mg of preservative free Decadron.
- Post-op knee immobilizer used to prevent falls due to Femoral Nerve motor blockade.

Materials and Methods

• The first 55 procedures performed under general anesthesia alone.

• The subsequent 30 procedures underwent a fascia iliaca block prior to general anesthesia.

• A third cohort of 60 procedures received lumbar plexus blockade prior to GA.
Materials and Methods

- Groups were compared with respect to:
  - Gender
  - Age
  - Procedure performed
  - Pain scores (0-10 scale) recorded at 0, 30, 60, 90 and 120 minutes postoperatively in the post-anesthesia care unit (PACU)
  - Total morphine-equivalent dose in the PACU
  - Time to discharge
  - Presence of nausea in the PACU requiring anti-emetic medication
Materials and Methods

- Groups were compared against one another using a two-tailed, unequal sample size and unequal variance independent sample Student’s t-test with regards to continuous demographic and postoperative data.
- Chi Square analysis was employed for categorical data.
- Pain scores were further analyzed to control for covariate pre-operative pain using ANCOVA.
- For the data analysis in this study, a p-value less than 0.05 was determined to be statistically significant signifying that a difference between the two experimental groups exists.
# Results

<table>
<thead>
<tr>
<th>Table 1: Patient Characteristics</th>
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<tbody>
<tr>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Gen (n=55)</th>
<th>Gen + FI (n=30)</th>
<th>Gen + LPB (n=60)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex, n</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>18</td>
<td>11</td>
<td>19</td>
</tr>
<tr>
<td>Female</td>
<td>37</td>
<td>19</td>
<td>41</td>
</tr>
<tr>
<td><strong>Age, mean ± Std Err</strong></td>
<td>34.51 ± 1.55</td>
<td>30.17 ± 2.47</td>
<td>35.45 ± 1.61</td>
</tr>
<tr>
<td><strong>Mean Height (m)</strong></td>
<td>1.69</td>
<td>1.69</td>
<td>1.7</td>
</tr>
<tr>
<td><strong>Mean Weight (kg)</strong></td>
<td>70.39</td>
<td>67.84</td>
<td>70.19</td>
</tr>
<tr>
<td><strong>Mean BMI (kg/m²)</strong></td>
<td>24.22</td>
<td>23.59</td>
<td>24.18</td>
</tr>
<tr>
<td><strong>Procedure Type, n (%)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Femoral Osteoplasty</td>
<td>47 (85.5)</td>
<td>21 (73.3)</td>
<td>51 (86.7)</td>
</tr>
<tr>
<td>Acetabular Osteoplasty</td>
<td>23 (41.8)</td>
<td>9 (30)</td>
<td>23 (38.3)</td>
</tr>
<tr>
<td>No Osteoplasty</td>
<td>7 (12.7)</td>
<td>8 (26.7)</td>
<td>8 (13.3)</td>
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<tr>
<td>Labral Repair</td>
<td>33 (60)</td>
<td>24 (80)</td>
<td>30 (50)</td>
</tr>
<tr>
<td>Labral Reconstruction</td>
<td>18 (32.7)</td>
<td>4 (13.3)</td>
<td>22 (36.7)</td>
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<tr>
<td>Labral Debridement</td>
<td>6 (10.9)</td>
<td>2 (6.7)</td>
<td>11 (18.3)</td>
</tr>
<tr>
<td>Capsular Plication</td>
<td>32 (58.2)</td>
<td>13 (43.3)</td>
<td>18 (30)</td>
</tr>
<tr>
<td>Glut min/med Repair</td>
<td>0 (0)</td>
<td>1 (3.3)</td>
<td>2 (3.3)</td>
</tr>
</tbody>
</table>
## Results

### Table 3. Pre-Operative and PACU Pain Scales

<table>
<thead>
<tr>
<th>Variable</th>
<th>Gen</th>
<th>Gen + F1</th>
<th>95% CI of difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>µ ± Std Err</td>
<td>n</td>
<td>µ ± Std Err</td>
</tr>
<tr>
<td>Pre-Op Pain</td>
<td>2.36±0.35</td>
<td>55</td>
<td>2.73±0.44</td>
</tr>
<tr>
<td>Pain in PACU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>t=0</td>
<td>3.25±0.45</td>
<td>55</td>
<td>4.12±0.72</td>
</tr>
<tr>
<td>t=30</td>
<td>4.1±0.39</td>
<td>55</td>
<td>4.72±0.58</td>
</tr>
<tr>
<td>t=60</td>
<td>3.62±0.33</td>
<td>54</td>
<td>4.08±0.48</td>
</tr>
<tr>
<td>t=90</td>
<td>3.32±0.37</td>
<td>37</td>
<td>3.5±0.4</td>
</tr>
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<td>t=120</td>
<td>3.08±0.49</td>
<td>18</td>
<td>3.85±0.74</td>
</tr>
</tbody>
</table>

### Table 4. Pre-Operative and PACU Pain Scales

<table>
<thead>
<tr>
<th>Variable</th>
<th>Gen</th>
<th>Gen + LPB</th>
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<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>t=0</td>
<td>3.25±0.45</td>
<td>55</td>
<td>2.03±0.39</td>
</tr>
<tr>
<td>t=30</td>
<td>4.1±0.39</td>
<td>55</td>
<td>3.08±0.4</td>
</tr>
<tr>
<td>t=60</td>
<td>3.62±0.33</td>
<td>54</td>
<td>2.57±0.29</td>
</tr>
<tr>
<td>t=90</td>
<td>3.32±0.37</td>
<td>37</td>
<td>2.16±0.29</td>
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<tr>
<td>t=120</td>
<td>3.08±0.49</td>
<td>18</td>
<td>1.57±0.38</td>
</tr>
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</table>

Independent sample Student’s t-test results for post-operative pain scores
Results

Table 2. Pre-Operative and PACU Pain Scales

<table>
<thead>
<tr>
<th>Variable</th>
<th>Gen</th>
<th>Gen + Fl</th>
<th>Gen + LPB</th>
<th>p-value</th>
<th>F-Ratio</th>
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</thead>
<tbody>
<tr>
<td>Pre-Op Pain</td>
<td>μ ± Std Err</td>
<td>n</td>
<td>μ ± Std Err</td>
<td>n</td>
<td>μ ± SD</td>
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<tr>
<td>t=0</td>
<td>2.36±0.35</td>
<td>55</td>
<td>2.73±0.44</td>
<td>30</td>
<td>2.63±0.3</td>
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- ANOVAᵇ and ANCOVAᶜ results. Analysis of covariance controlling for covariate pre-operative pain.
Results

Pain Scores averaged across all time intervals in PACU. Error bars represent standard error of the mean.
Results

Pain Scores in PACU
Results

• No difference in morphine-equivalent dosage
• No difference in time to discharge
• No difference in nausea requiring anti-emetics
Results

• No complications in Gen or Fl groups

• There were no falls in either group

• There was a seizure of ~10 seconds in one patient in the LPB group

  o Patient was closely monitored and had no drop in oxygen saturation or blood pressure, no arrhythmia and had an immediate and complete recovery after the seizure

  o Decision was made to continue with surgery, which proceeded without further complication
Limitations

• Retrospective
• Single surgeon
• Single facility
• Several different nurses in the PACU
• Three different anesthesiologists
• No clear protocol set prior to initiation of the trial for administration of narcotics, anti-emetics or criteria for discharge
• Pain scores were patient reported to nurses in the PACU, not to an unbiased observer.
Conclusions

• No significant benefit to Fascia Iliaca Block in concert with GA versus GA alone
  
  o Given the extra time, cost, potential risk, consideration should be given to abandoning this for hip arthroscopy
  o Femoral Nerve and Lateral Femoral Nerve blockade insufficient to provide meaningfully beneficial changes in post-op pain, nausea, time in PACU, morphine equivalent dosage
    • No blockade of Obturator, Nerve to Quadratus, Sciatic,
Conclusions

• Lumbar Plexus Block administered in conjunction with GA provides significant and clinically meaningful decrease in post-operative pain in PACU

• Risks of LPB and experience of anesthesiologist should be considered before offering this technique to patients
References

• Anaraki et al. The Effect of Fascia Iliaca Compartment Block Versus Gabapentin on Postoperative Pain and Morphine Consumption in Femoral Surgery, a Prospective, Randomized, Double-Blind Study. Indian J Pain 2014;28(2)111-116.
• Fascia Iliaca Block. The New York School of Regional Anesthesia—NYSORA 2013.
• Lumbar Plexus Block. The New York School of Regional Anesthesia—NYSORA 2013.