Effect of Intra-bursal steroid injection on regional bone mineral density (BMD)

A pilot study to evaluate the effect of intra-bursal steroid injection on bone mineral density (BMD) of hip of symptomatic postmenopausal women with greater trochanteric bursitis

Shameem Beigh, MBBS
Joseph Grisanti, MD
Objective

• To determine if there is any difference in BMD of greater trochanter 6 weeks post intra bursal injection.

• To study the systemic effect of intra bursal injection by comparing the BMD of spine and contralateral hip 6 months after the initial study.
Trochanteric Bursitis

- Greater trochanteric pain syndrome
  - Inflammation or irritation of the bursa / bursae located at the insertion of the gluteal muscles at the greater trochanter of the femur.
  - Peak incidence: Between the fourth and sixth decades of life
  - F:M 4:1
  - Prevalence is 3200/100000.
• Bursa or lateral hip injections performed with corticosteroid and local anesthetics
• 70% of patients respond after first injection and >90% respond to two injections.
• 25% of patients receiving steroid injection may develop a relapse.
Repository corticosteroids

- Potent long acting anti-inflammatory medications.
- Designed to remain at the site of injection for 4-6 weeks.
- Often used to treat regional pain syndromes affecting the musculoskeletal systems.
- Intra-articular, intra-bursal and epidural injections.
- Side effects from systemic use of steroids:
  - Osteoporosis
  - Osteonecrosis
  - Cataract development
  - Glucose intolerance
Corticosteroid use can disrupt skeletal architecture
- less clear whether intra-bursal injections result in a decrease of BMD.

Repository corticosteroids are often injected in close proximity to bone
- ? possible local effect to adjacent bone
- ? Possible systemic effect from the use of potent long acting steroids.
Rationale

• Although it is known that corticosteroid use can have a profound systemic effect on BMD and skeletal architecture, it is less clear whether intra-bursal injections influence BMD regionally.

• Primary purpose of this study is to assess the regional affects of a repository corticosteroid injection on BMD on bone adjacent to the site of the soft tissue injection.

Relationship between **bone mineral density** and the frequent administration of **epidural** steroid **injections** in postmenopausal women with low back pain/La relation entre la densité minérale osseuse et de fréquentes **injections**...

by **Sungyun Kim; Byeongmun Hwang**

Pain Research & Management : The Journal of the Canadian Pain Society, 01/2014, Volume 19, Issue 1
• Other than the anticipated loss of BMD due to aging, the use of an epidural corticosteroid injection did not result in additional loss of BMD.
Rationale

2. **Effect** of **epidural** steroid **injection** on **bone** mineral **density** and markers of **bone** turnover in postmenopausal women

by Al-Shoha, Ahmad; Rao, D Sudhaker; Schilling, Jennifer; [more...](#)

Spine, 12/2012, Volume 37, Issue 25

- Prospective observational study
- Significant decline in the hip BMD of 0.018 g/cm (0.028 ± 0.007, P = 0.002) at 6 months compared with baseline.
- Single Epidural Spinal Injection in postmenopausal women adversely affects BMD of the hip.
- The resulting decrease in BMD, while slight, suggests that ESIs should be used with caution in those at a risk for fracture.
Question #1

This study was designed to answer the following question: “Does a repository steroid injection influence regional BMD?”

To answer this question we designed an experiment assessing BMD measurements before the single hip injection and six weeks later.
“If there is a difference, is the difference related to a systemic effect of the steroid injection or a regional effect?”

To answer this question we scanned the lumbar spine and the opposite hip to use as controls
Question #3

“If there is an effect on the bone, is the effect temporary?

To answer this question, we will repeat the DEXA scan 6 months later.
Materials & Methods

• A pilot study

• Primary method of statistical analysis paired t-tests.

• Informed consent

• Institutional Review Board Approved – Catholic Health System IRB (CHS IRB), Buffalo, NY (CHS/RB/1413)

• Medical history and demographics
Inclusion criteria

- Capacity to give informed consent
- Postmenopausal women with symptomatic trochanteric bursitis in need of intra bursal steroid.
Exclusion Criteria

- Patients on high doses of Vitamin D (50000 IU), HRT, or on Teriparatide.
- Hip replacement on injection side.
- History of bone cancer, multiple myeloma, Paget’s disease.
- History of Intra-articular injection less than 4 weeks prior to study.
- Patients on more than 10 mg of prednisolone (or equivalent) within 4 weeks of study.
- Patients on oral Bisphosphonates within 6 months of study.
- Patients on IV Bisphosphonates within 12 months prior to study.
Materials & Methods

- Baseline BMD assessment using a Hologic Discovery Dual Energy X-Ray Absorptiometer (DEXA Scanner) performed immediately prior to hip injection

- B/L Neck, Greater Trochanter, Intertrochanteric and Spine

- Intra trochanteric bursal injection of 60 mg of triamcinolone acetonide (Kenalog)

- Repeat BMD assessment using same DEXA Scanner with the same technician 6 weeks post injection.
Materials & Methods

• Subsequent 6 month DEXA scan to see systemic effects

• B/L Neck, Greater Trochanter, Intertrochanteric and Spine

• All measurements to be conducted on the same machine using the same certified X-ray densitometrist.
Central DEXA Hip

DXA Results Summary:

<table>
<thead>
<tr>
<th>Region</th>
<th>Area (cm²)</th>
<th>BMC (g)</th>
<th>BMD (g/cm²)</th>
<th>T-Score</th>
<th>Z-Score</th>
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<tr>
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Total BMD CV 1.09%, ACF = 1.024, BCF = 0.997, TH = 6.228
WHO Classification: Normal
Fracture Risk: Not Increased

Total

BMD

Age
Central DEXA Hip

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Total BMD vs Age
Statistical Analysis

• Statistical analysis was performed using a paired two-sided T-test.

• Descriptive statistics, such as means, counts and percentages used to summarize most data.

• Subject demographics, baseline data, and post-injection data

• $P < 0.05$ was considered significant
### Results

<table>
<thead>
<tr>
<th>Patient ID</th>
<th>Study Mean</th>
<th>95% Confidence Interval</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>62</td>
<td>52</td>
<td>72</td>
<td>56</td>
</tr>
<tr>
<td>BMI</td>
<td>33.8</td>
<td>33.9</td>
<td>39.3</td>
</tr>
<tr>
<td>Injection Site</td>
<td>Left Trochanter</td>
<td>Right Troc.</td>
<td>Right Troch.</td>
</tr>
<tr>
<td>Pre Injection BMD</td>
<td>2/11/15</td>
<td>10/6/14</td>
<td>11/12/14</td>
</tr>
<tr>
<td>Pre Trochanter</td>
<td>0.765</td>
<td>1.058</td>
<td>0.74</td>
</tr>
<tr>
<td>Post Trochanteric</td>
<td>0.76</td>
<td>1.035</td>
<td>0.719</td>
</tr>
<tr>
<td>Difference Post - Pre</td>
<td>-0.005</td>
<td>-0.023</td>
<td>-0.021</td>
</tr>
<tr>
<td>Difference %</td>
<td>-0.7%</td>
<td>-2.2%</td>
<td>-2.8%</td>
</tr>
</tbody>
</table>

- Mean change of **-2.5%** (decline) in BMD
- **P-value of 0.032**
- 95% confidence interval about the mean of **-4.6% to -0.4%**.
- This analysis is statistically significant and indicates that the observed difference is not likely due to chance.
Results

Patient #1  Patient #2  Patient #3  Patient #4  All

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<td>Post Trochanter</td>
<td>0.719</td>
<td>0.719</td>
</tr>
<tr>
<td>Pre Trochanter</td>
<td>0.551</td>
<td>0.522</td>
</tr>
<tr>
<td>Post Trochanter</td>
<td>0.522</td>
<td>0.522</td>
</tr>
<tr>
<td>Pre Trochanter</td>
<td>0.759</td>
<td>0.759</td>
</tr>
<tr>
<td>Post Trochanter</td>
<td>0.779</td>
<td>0.779</td>
</tr>
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</table>
Conclusion

• The study observed a statistically significant decline in BMD at greater trochanter of the injected hip.
• Post menopausal woman lose about 0.5% of BMD per year in general.
• Does this translate an increased risk of fracture.
• People get recurrent injections for GTPS.
• Are they getting a taking a hit every time they get the injection.
• Does the single use of Bisphosphonate after the injection help.
• Do we need to do any additional analysis.
Conclusion

• This is a preliminary study.

• The results are interim.

• The study is ongoing and more patients will get DEXA scans including DEXA at 6 Months.

• Final results will be published.
References


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