INTRODUCTION / PURPOSE

Hallux valgus deformity is common in individuals with cerebral palsy and other spasticity disorders due to the imbalance of the intrinsic musculature and abnormal extrinsic muscular function in the lower extremity. Previous literature on the treatment of hallux valgus deformity in patients with underlying spasticity disorders (e.g., cerebral palsy) historically promotes arthrodesis of the first metatarsophalangeal joint.

The percutaneous bunionectomy was trialed as an alternative treatment option for correction of hallux valgus deformity amongst this unique patient population. The technique was first described by Bosch and colleagues in 1990, and with minor modifications this unique patient population. The technique was first described by Bosch and colleagues in 1990, and with minor modifications this unique patient population. The technique was first described by Bosch and colleagues in 1990, and with minor modifications this unique patient population. The technique was first described by Bosch and colleagues in 1990, and with minor modifications this unique patient population. The technique was first described by Bosch and colleagues in 1990, and with minor modifications this unique patient population. The technique was first described by Bosch and colleagues in 1990, and with minor modifications this unique patient population.

PATIENT SELECTION

- Three young adult patients all with underlying spasticity disorders.
  - One patient with bilateral hallux valgus deformities.
  - Two patients with unilateral hallux valgus deformity.
  - All four hallux valgus deformities underwent correction utilizing the percutaneous bunion technique.

Patient information is depicted in Table 1.

- Two lead attending surgeons performed the operative technique for the percutaneous bunion correction as described by Siddiqui. #ref.
- All patients and/or caregivers complained of painful bunion deformity causing discomfort during ambulation, or difficulty with shoe gear, prior to operative intervention.

Table 1

<table>
<thead>
<tr>
<th>Patient</th>
<th>Right</th>
<th>Left</th>
<th>Gender</th>
<th>Laterality of Hallux Valgus</th>
<th>Age at Time of Procedure</th>
<th>Previous surgeries</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td>Male</td>
<td>Right</td>
<td>23</td>
<td>None</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td>Male</td>
<td>Left</td>
<td>22</td>
<td>None</td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
<td>Male</td>
<td>Left</td>
<td>21</td>
<td>None</td>
</tr>
</tbody>
</table>

OPERATIVE TECHNIQUE

Step 1. 2mm K-wires were inserted from the distal medial aspect of the great toe to the medial aspect of the head of the first metatarsal in an extraperiosteal fashion (Figure 1a).

Step 2. Incision made along the medial aspect of the first metatarsal and a 1.8mm K-wire was inserted from medial to lateral direction (Figure 2a, 2b).

Step 3. Osteotome and/or micro-sagittal saw used to complete the osteotomy (Figure 3).

Step 4a. Hallux manipulated into position with simultaneous translation of the capital fragment and correction of the frontal plane deformity (Figure 4a).

Step 4b. 2mm K-wires advanced down the medullary shaft of the 1st metatarsal (Figure 4b).

Step 4c. 1st metatarsal held in “Operative Guide Wire” (Figure 5).

Step 4d. Hallux manipulated into position with simultaneous translation of the capital fragment and correction of the frontal plane deformity (Figure 6).

PATIENT DATA

- Preoperative evaluation of the hallux valgus deformities included multiple views of weight bearing foot radiographs (Figure 7).
- Standard first ray angles were appropriately calculated for operative planning prior to surgical intervention. Pre-operative hallux valgus angles are listed in Table 2.
- Preoperative radiographs were taken at a postoperative follow up visit. (Figure 7)
- All patients were placed in a non-weight bearing short leg cast following operative intervention. (Figure 6)
- Post operative follow up visits with the attending surgeons were performed at two-three week intervals until percutaneous K-wire fixation was removed.

Table 2

<table>
<thead>
<tr>
<th>Patient</th>
<th>Intermetatarsal Angle</th>
<th>Hallux Abductus Angle</th>
<th>Tibial Sesamoid Position</th>
<th>Average Correction</th>
</tr>
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<tbody>
<tr>
<td>A</td>
<td>11</td>
<td>21</td>
<td>3</td>
<td>11.75</td>
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<tr>
<td>B</td>
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<td>4</td>
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<tr>
<td>C</td>
<td>3</td>
<td>6</td>
<td>3</td>
<td>2.75</td>
</tr>
</tbody>
</table>

RESULTS

Comparison of pre-operative to post-operative radiographic values were calculated and averaged for overall deformity correction amongst the four different procedures. These results are listed in Table 5. Amongst four hallux valgus deformity correction there was an average correction of 4.5 degrees at the interarticular angle, an average 21.75 degree correction for the hallux abductus angle, an average 14.5 degree correction for the proximal articular set angle, and an average tibial sesamoid position translation of 2.75 positions.

Table 5

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Intermetatarsal Angle</th>
<th>Hallux Abductus Angle</th>
<th>Tibial Sesamoid Position</th>
<th>Average Correction</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>3.75</td>
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<tr>
<td>B</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>13.25</td>
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<tr>
<td>C</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>2.75</td>
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</tbody>
</table>

CONCLUSION

Based on the successful results of this small case series, the two lead surgeons suggest that the percutaneous bunionectomy procedure be considered as a treatment option for correction of hallux valgus deformity in patients with an underlying spasticity disorder.

This case series depicts the need for further research involving the percutaneous bunionectomy procedure while incorporating a larger patient population and long term follow up (i.e. 5-10 years) after hallux valgus deformity correction.

Overall, this series provides a joint sparing treatment option for patients with spasticity disorders and should be considered as an option for skilled and able surgeons, when appropriate.

REFERENCES