THE CLINICAL EXAM OF PLANTAR PLATE PATHOLOGY: A DIAGNOSTIC PERSPECTIVE

ERIN E KLEIN, DPM, MS
LOWELL WEIL, JR, DPM
LOWELL SCOTT WEIL, SR, DPM
MICHAEL COUGHLIN, MD

WEIL FOOT & ANKLE INSTITUTE
DES PLAINES, ILLINOIS
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E R I N  E. K L E I N , D P M , M S


INTRODUCTION

- Plantar plate tears can cause significant pain and deformity of the forefoot.
- Previous research has suggested that pain, edema, a positive drawer sign and crossover toes are high correlated with plantar plate pathology\textsuperscript{1-3}.
- This pathology is often missed on initial diagnosis as previous discussions of clinical diagnostic parameters have not been well established.

Therefore, the purpose of this study is to:

- Clarify which common clinical findings are related to observed intra-operative pathology.
- Compare the sensitivity, specificity, positive predictive value and negative predictive values of commonly observed clinical parameters and commonly performed clinical tests using observed intra-operative pathology as the gold standard of reference.
METHODS

- Records were reviewed for 90 patients (109 feet) who underwent plantar plate repair

- Patient history parameters that were investigated:
  - Sudden onset
  - Gradual onset
  - Pain for more than 6 months
  - Previous first ray surgery
  - Previous cortisone injections

- Patient clinical parameters that were investigated:
  - Pain at the 2nd metatarsal head
  - Edema at the 2nd metatarsal head
  - Positive drawer sign
  - Pain with 2nd metatarsophalangeal joint ROM
  - First metatarsophalangeal ROM greater than 60°
  - First metatarsophalangeal ROM less than 60°
  - Crossover toes

- These findings were analyzed utilizing the observed intra-operative pathology as the gold standard of reference.
### RESULTS – PATIENT HISTORY PARAMETERS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Incidence (%)</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>Positive Predictive Value</th>
<th>Negative Predictive Value</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sudden onset</td>
<td>7%</td>
<td>7</td>
<td>100</td>
<td>100</td>
<td>8.9</td>
<td>NA</td>
</tr>
<tr>
<td>Gradual onset</td>
<td>93%</td>
<td>93</td>
<td>0</td>
<td>91.2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pain &gt;6 months</td>
<td>69%</td>
<td>73.4</td>
<td>28.6</td>
<td>93.2</td>
<td>7.4</td>
<td>1.104</td>
</tr>
<tr>
<td>Previous 1st ray surgery</td>
<td>18%</td>
<td>100</td>
<td>0</td>
<td>94.7</td>
<td>0</td>
<td>NA</td>
</tr>
<tr>
<td>Previous cortisone injection</td>
<td>21%</td>
<td>22.1</td>
<td>62.5</td>
<td>87.5</td>
<td>6.3</td>
<td>0.473</td>
</tr>
<tr>
<td>Parameter</td>
<td>Incidence</td>
<td>Sensitivity</td>
<td>Specificity</td>
<td>Positive Predictive Value</td>
<td>Negative Predictive Value</td>
<td>Odds Ratio</td>
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<td>------------------------------------------</td>
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<tr>
<td>Pain - 2(^{nd}) metatarsal head</td>
<td>98%</td>
<td>98</td>
<td>11.1</td>
<td>92.5</td>
<td>33.3</td>
<td>6.125</td>
</tr>
<tr>
<td>Edema - 2(^{nd}) metatarsal head</td>
<td>92%</td>
<td>95.8</td>
<td>11.1</td>
<td>92.0</td>
<td>20.0</td>
<td>2.875</td>
</tr>
<tr>
<td>Positive drawer sign</td>
<td>75%</td>
<td>80.6</td>
<td>99.8</td>
<td>92.6</td>
<td>10.0</td>
<td>1.389</td>
</tr>
<tr>
<td>Pain with 2(^{nd}) MTP joint ROM</td>
<td>28%</td>
<td>31.5</td>
<td>77.8</td>
<td>93.3</td>
<td>10.3</td>
<td>1.607</td>
</tr>
<tr>
<td>Crossover toes</td>
<td>8%</td>
<td>8.0</td>
<td>88.9</td>
<td>88.9</td>
<td>8.0</td>
<td>0.696</td>
</tr>
</tbody>
</table>
A good clinical exam can heighten the suspicion for plantar plate tears when the data is interpreted correctly.

In patients with observed intra-operative plantar plate tears, the clinical exam parameters with the highest incidence were: gradual onset of pain unresolved after 6 months, edema and a positive drawer test.

All clinical exam parameters investigated in this study have a high sensitivity.

Clinical exam findings with high specificity (>90%) include:
- Positive drawer test, rigid 2nd MTPJ deformity, pain with 2nd MTPJ ROM, a crossover toe, a previous diagnosis of a 2nd inter-space neuroma and pain present for more than 6 months.

Clinical exam findings with high positive predictive values include:
- Gradual onset of pain and edema.

When pain, edema, a positive drawer sign and gradual onset of pain are combined, this will correctly identify 95% of patients with plantar plate pathology.
Although plantar plate tears have many common physical exam findings, gradual onset of pain, edema and a positive drawer sign are the most highly correlated with plantar plate pathology. Therefore, in a patient with gradual onset of 2nd lesser metatarsal pain unresolved after 6 months, edema and a positive drawer sign, a plantar plate tear should be suspected.
References:


Thank you!
Eek@weil4feet.com

@eriveve27 @weil4feet