Non-surgical treatment of Pes planovalgus associated pain
A systematic review
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Background
Pes planovalgus or flatfoot-associated complaints are frequent symptoms, which are thought to be caused by the foot deformity itself. The chronic degeneration of the posterior tibialis tendon is widespread with a prevalence of approximately 10% [1, 2]. Affected patients suffer from functional impairment and pain. Less severe cases at an early stage are eligible for non-surgical treatment (Table 1). There is only limited evidence concerning the numerous therapy approaches since high quality studies are missing. Nonetheless, foot orthoses are considered to be the first line therapy approach.

<table>
<thead>
<tr>
<th>Stadium</th>
<th>Deformation</th>
<th>Clinical signs</th>
<th>Pain along tendon, beginning of degenerative process</th>
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</thead>
<tbody>
<tr>
<td>I [3]</td>
<td>none</td>
<td>degeneration</td>
<td>Cobbian arch, no Single Leg Heel Rise possible</td>
</tr>
<tr>
<td>III [3]</td>
<td>fixed</td>
<td>partial or total rupture, no complete inversion possible</td>
<td></td>
</tr>
<tr>
<td>IV [4]</td>
<td>fixed</td>
<td>chronic total rupture, osteoarthritis</td>
<td></td>
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</tbody>
</table>

Methods
In January 2013, a systematic literature search was done in the databases Pubmed/MEDLINE, Cinahl, PEDro, Web of Science and Google Scholar concerning non-operative treatments for PTTD (stage I and II after Johnson & Strom) [3]. Pain was defined as primary outcome. Exclusion criteria were as follows: PTTD stage III or IV, surgery, published before January 2001, other language than English, German, French or Italian. Key words were flatfoot, PTTD, conservative, usual care, orthoses, pain, functional and further more. All authors read the seven found articles and decided on in- or exclusion of the respective study. If not all authors agreed on in- or exclusion of the article, discussion took place until consensus was achieved.

Results
In total, seven studies with 214 patients were analyzed (Fig. 1).

Discussion
Positive effects could be found either with foot orthoses only or with combined interventions. Only two controlled studies [8,10] could be included and analyzed. Unfortunately no single intervention could be found to be responsible for improvements in function and/or pain reduction. In more than one study there was no control group, only a small number of patients or different assessments were used for the evaluation of functional impairment or pain. Therefore a direct comparison of all included studies was not possible.

Conclusion
Even though a positive effect with conservative therapy could be found for PTTD stage I & II, it remains unclear which approach works best for this patient group. Nevertheless, physiotherapeutic interventions with and without prescribed orthoses seem to relief pain and improve functional outcomes.

Implications
Further prospective, randomized-controlled studies of high quality will be needed in the future to get evidence about the efficacy of single therapy applications for Pes planovalgus associated complaints.

References
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Ethics
Ethical approval was not necessary for this systematic review.