The Use of Infrared Thermometry in Confirming First Metatarsophalangeal Joint Fusion

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**Introduction/Purpose:** Confirming the presence or absence of union is a critical determination in the care of individuals following attempted surgical fusion. This most commonly is done using clinical examination in conjunction with imaging. Infrared thermometry (IRT) has been used in other areas of clinical foot and ankle care, and has been shown to be a reliable method of measuring skin temperature.

Given the complex morphology of the foot and ankle and the confounding clinical presentation of cases of foot and ankle fusions during the post-operative recovery, trying to determine the presence of absence of clinical union can be difficult. An adjunctive method to further inform the post-operative recovery would be helpful.

In this study, IRT is investigated as an adjunctive method of confirming clinical union of attempted first metatarsophalangeal (or 1st MTP) fusion.

**Methods:** Thirty-three individuals undergoing 1st MTP joint fusion were prospectively measured using IRT. Temperature at the 1st MTP site was recorded preoperatively, 10-14 days postoperatively, 42 days postoperatively, and 90 days postoperatively. Each case was followed post-operatively as per usual clinical care guidelines, and union was confirmed by a combination of clinical examination and radiographs. All data were collected from two testing centers, using compatible IRT devices.
**Results:** Temperature at the 1st MTP site increased from preoperatively (82.7°F ± 4.4°) to 10-14 days postoperatively (89.2°F ± 2.7°; \( p < .001 \)); it declined from 10-14 days postoperatively to 42 days postoperatively (84.5°F ± 3.9°; \( p < .001 \)); and it declined from 42 days postoperatively to 90 days postoperatively (81.5°F ± 4.6°; \( p < .001 \)). The final temperature was statistically not significant from the pre-operative value, or the value measured on the opposite 1st MTP joint.

Temperature data collected from one of the testing centers was significantly higher than the data collected from the other center (\( p < .001 \)), suggesting a potential location or climate effect. No non-unions were recorded during the study.

**Conclusion:** Results suggest that IRT was successful in predicting and confirming union in the setting of 1st MTP joint fusion - where temperature of the 1st MTP joint returned to pre-operative and opposite side levels. For this reason, IRT presents itself as a valuable adjunct in the setting of 1st MTP joint fusion. Collecting contralateral foot temperature data may be a less biased means of tracking the progression of healing than the use of absolute foot temperatures, and a method to avoid regional ambient temperature differences.

<table>
<thead>
<tr>
<th></th>
<th>Preop M (SD)</th>
<th>Postop 10-14 M (SD)</th>
<th>Postop 42 M (SD)</th>
<th>Postop 90 M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st MTP Temp</td>
<td>82.7 (4.4)a</td>
<td>89.2 (2.7)b</td>
<td>84.5 (3.9)c</td>
<td>81.5 (4.6)a</td>
</tr>
</tbody>
</table>

\( a,b \): Homogenous subsets