## Utility of long hip to ankle radiographs in evaluating limb length equality after prosthesis fitting for patients with lower extremity osseointegration

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INTRODUCTION: Since osseointegrated limbs do not change position as socket prostheses do, the normal goal is to provide patients equal limb length to optimize gait and minimize pain related to limb length difference. Typically, a prosthetist evaluates the limb lengths clinically, without access to a long leg radiograph (LLR), which is a common technique for limb lengthening surgeons. The usefulness of the LLR after osseointegrated prosthesis provision has never been evaluated. The aim of this study was to assess the value of LLR to evaluate the accuracy of limb length after the first fitting of the prosthetic leg following osseointegration.

METHODS:

Medical records at a single institution were reviewed of 124 patients (72 femur and 42 tibia) patients who had unilateral and/or bilateral femur and/or tibial osseointegration and also LLR following prosthesis fitting. Limb length discrepancy (LLD) was measured using the indirect method (difference from a plumb line between the two hip joints). The LLD was tabulated both as the raw amount and also categorized as ≤5 mm, 5-10 mm, 10-20 mm, or ≥20 mm.

RESULTS:

The average ILLD was 9.9±8.7 mm (range 3 to 48 mm). Table 1 shows that for both femur and tibia, the most common LLD was ≤5 mm (27 (37.5%) femur, 19 (36.5%) tibia) and the least common was ≥20 mm (11 (15.3%) femur, 3 (5.8%) tibia). There was no significant difference between the accuracy of femur versus tibia patients (≤5 mm 37.5% vs 36.5%, p=.435).

DISCUSSION AND CONCLUSION:

In this cohort, 62.9% of patients exceeded 5 mm and 37.1% exceeded 10 mm of LLD. While it is uncertain how much LLD is impactful to osseointegrated patients, given that the osseointegrated prostheses do not change position the way socket prostheses do, it seems obtaining an LLR after the first prosthesis fitting is useful to achieve limb length equality, which is a standard goal for non-amputated patients. Further research is merited to determine a typical patient-reported detectable difference.

| | ≤5 | 5-10 | 10-20 | ≥20 |
|---|---|---|---|---|
| **All** | 46 (37.1%) | 32 (25.8%) | 32 (25.8%) | 14 (11.3%) |
| **Femur** | 27 (37.5%) | 18 (25%) | 16 (22.2%) | 11 (15.3%) |
| **Tibia** | 19 (36.5%) | 14 (26.9%) | 16 (30.8%) | 3 (5.8%) |