

Osseointegration Outcomes Following Amputee Lengthening

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Abstract : Introduction: Percutaneous EndoProsthetic Osseointegration for Limbs (PEPOL) facilitates improved quality of life (QOL) and objective mobility for most amputees discontent with their traditional socket prosthesis (TSP) experience. Some amputees desiring PEPOL have residual bone much shorter than the currently marketed press-fit implant lengths of 14-16 cm, potentially a risk for failure to integrate. We report on the techniques used, complications experienced, the management of those complications, and the overall mobility outcomes of seven patients who had femur distraction osteogenesis (DO) with a Freedom nail followed by PEPOL. Method: Retrospective evaluation of a prospectively maintained database identified nine patients (5 females) who had transfemoral DO in preparation for PEPOL with two years of follow-up after PEPOL. Six patients had traumatic causes of amputation, one had perinatal complications, one was performed to manage necrotizing fasciitis and one was performed as a result of osteosarcoma. Result: The average age at which DO commenced was 39.4 ± 15.9 years, and seven patients had their amputation more than ten years prior (average 25.5 ± 18.8 years). The residual femurs, on average, started at 102.2 ± 39.7 mm and were lengthened 58.1 ± 20.7 mm, $98 \pm 45\%$ of the goal ($99 \pm 161\%$ of the original bone length). Five patients (56%) had a complication requiring additional surgery: four events of inadequate regeneration were managed with continued lengthening to the desired goal followed by autograft placement harvested from contralateral femur reaming; one patient had the cerclage wires break, which required operative replacement. All patients had osseointegration performed at 355 ± 123 days after the initial lengthening nail surgery. One patient had K-level >2 before DO, at a mean of 3.4 ± 0.6 (2.6-4.4) years following osseointegration. Six patients had K-level >2 . The 6-Minute Walk Test remained unchanged (267 ± 56 vs. 308 ± 117 meters). Patient self-rating of prosthesis function, problems, and amputee situation did not significantly change from before DO to after osseointegration. Six patients required additional surgery following osseointegration: six to remove fixation plates placed to maintain distraction osteogenesis length at osseointegration; two required irritation and debridement for infection. Conclusion: Extremely short residual femurs, which make TSP use troublesome, can be lengthened with externally controlled telescoping nails and successfully achieve osseointegration. However, it is imperative to counsel patients that additional surgery to address inadequate regeneration or to remove painful hardware used to maintain fixation may be necessary. This may improve the amputee's expectations before beginning a potentially arduous process.

Keywords : osseointegration, limb lengthening, quality of life, amputation

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