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CORR Insights®: Is there an Increase in Valgus Deviation in Tibial Distraction Using the Lengthening Over Nail Technique?

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Where Are We Now?

Park and colleagues conducted a retrospective study on patients undergoing bilateral tibial lengthening using the lengthening over nail technique. The study found that the valgus deformity of the tibia, which can develop during treatment

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with the Ilizarov approach to limb lengthening, also occurred in the lengthening over nail technique. The study investigated whether the valgus deformity of the tibia could be avoided by using different interventions including: (1) Use of a blocking screw, (2) different placements and designs of the proximal locking screws in the nail, (3) insertion of a thicker or longer intramedullary nail, and (4) leaving a longer portion of the nail in the distal fragment after lengthening. In a multivariate regression model, the use of a blocking screw in the distal segment was the only factor that was associated with decreased valgus deviation. This manuscript brings to light two topics of interest: (1) The indication for performing cosmetic bone lengthening and (2) minimizing complications in bone lengthening.

Park and colleagues performed bilateral lower leg lengthening for familial short stature. During this

cosmetic leg lengthening, the introduced valgus deviation of the tibia resulted in a change of the mechanical femorotibial angle from 2° varus to 3° valgus. It can be speculated that the shift in the mechanical axis and subsequent change of the load distribution in the knee joint might result in premature arthritis. It appears that valgus malalignment increases early arthritis [1], though in fairness, it is unknown whether the change in mechanical femorotibial angle during lengthening over the nail is large enough to cause this complication.

The study emphasizes the idea that apparent advantages of a new technique are not always borne out in practice. If the intramedullary nail should prevent bony deformity during lengthening, the nail should have the same diameter as the intramedullary canal and the lengthening should be performed through a mid-diaphyseal osteotomy. However, the osteotomy is often placed away from the mid-diaphyseal region in order to enhance bone healing of the regenerate. Park and colleagues placed the osteotomy at the junction between the proximal and

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middle third of the tibia, and an overall valgus deformity was introduced in the 60 tibial lengthenings. However, the placement of a blocking screw in 28 patients in the distal segment was associated with decreased valgus deviation.

Where Do We Need To Go?

If surgeons consider limb lengthening in musculoskeletal healthy patients only with the purpose to increase height, it is particularly important that we remember the adage, “Above all, do no harm.” Complications are common in cosmetic bone lengthening procedures, and they can be severe [3]. As previously suggested [2, 4], long-term studies on cosmetic limb lengthening evaluating limb function and patient gains, including psychological validated outcome measurements, are warranted.

In the treatment of congenital or acquired limb-length discrepancies, the goal is to achieve the desired limb lengthening with minimal patient discomfort and with a low risk of complications. This has led to a shift from performing distraction osteogenesis with external fixation towards combined external and internal methods, and lately the introduction of purely internal bone lengthening nails. The study by Park and colleagues demonstrates the need for studies

investigating whether new techniques indeed do lower complication rates.

How Do We Get There?

An evidence-based approach should be applied in bringing new orthopaedic devices to market [5]. Both preclinical and clinical research is needed in the introduction of new internal bone lengthening techniques. Long-term clinical studies reporting patient-related outcome measurements and complication rates for the variety of limb length discrepancies treated with internal bone lengthening are needed.

The ideal placement of blocking screws to prevent bony deformity without inhibiting bone lengthening must be validated. Lengthening nails with angular stable locking options in different planes in close proximity to the osteotomy site might be capable of preventing deformity during lengthening. Acute deformity correction can be performed through the osteotomy site used for subsequent internal bone lengthening. However, research is needed to determine the maximum deformity that can be acutely corrected without compromising the healing capacity of the bone regenerate during subsequent lengthening.

The possibilities of internal implants allowing both gradual bone deformity correction and gradual bone lengthening should be examined. Park

and colleagues allowed the patients to fully weight-bear when two cortices became evident in the regenerate on radiographs. Studies are needed to reveal the ideal weight-bearing regime that secures good bone healing without introducing bone deformity during internal bone lengthening.

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