

# Response to comment on Siddiqui et al: 'Femoral shaft fractures in children with non-ambulatory neuromuscular disorders can be effectively treated using flexible intramedullary nails'

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Dear Colleagues,

We would like to thank you for your thoughtful comments and suggestions in regard to our study.<sup>1</sup>

A recent study from our institution evaluated the very topic of length unstable femur fractures treated with flexible intramedullary nails.<sup>2</sup> Although previous studies have deemed length unstable patterns to be a contraindication to flexible intramedullary nailing, our recent analysis suggests the opposite and at our institution we have found great success with flexible intramedullary nailing in this fracture pattern in typically-developing patients. Further analysis is needed to evaluate this in the neuromuscular population. In addition, we have not found a clinical association between mild femoral angulation (< 25°) and risk of subsequent fracture, although we recognize that this is level 5 evidence. We urge the authors to pursue this concept and look forward to a potential publication from them that can help us improve our care for these patients. The authors' comments regarding the impact of malalignment on forces across a malunion in spastic neuromuscular patients, although possible, seems to be based mostly on hypothesis and not scientific data at this time.

We agree with the authors that an ideal construct would be maximum spread of the intramedullary nails at the fracture site, and to some degree this can be affected by intraoperative rod bending. Unfortunately, despite careful

attention to preoperative nail bending, this is not always possible in non-ambulatory neuromuscular patients due to their bones' small size and unique biomechanical properties. As one can see from the healed radiograph, this particular patient had a good outcome with complete bony healing and no signs of angular deformity, which included the sagittal plane not pictured in the publication. We are also in agreement that we would preferentially have two intramedullary nails in all patients; however, we feel as though a single nail, of largest diameter possible, provides enough stability to maintain adequate alignment in order to decrease the length and/or need for external mobilization, such as casting, while using a load-sharing implant to decrease the risk of subsequent femur fracture in this at-risk patient population.

We are also in agreement that other implant options are available and are of potential benefit in this population. Yet, to our knowledge, there continues to be a lack of published data on the use of telescoping rods, rush rods and Enders nails in the treatment of these fractures. We again encourage the authors to publish their data and experience so that we may all improve the quality of care and we can further explore what the best treatment options are for our neuromuscular patients.

Yours sincerely,  
The Authors

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## COMPLIANCE WITH ETHICAL STANDARDS

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### ICMJE CONFLICT OF INTEREST STATEMENT

KDI reports being a paid presenter or speaker for Nuvasive, outside the submitted work.

EMM reports holding stock or stock options in Joint Development LLC, outside the submitted work.

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RMK reports holding stock or stock options in Biomet, Johnson & Johnson, Medtronic, Pfizer and Zimmer; is a board or committee member of Commission for Motion Lab Accreditation; son is an employee of Intrinsic Therapeutics; and is on the editorial or governing board of *Journal of Pediatric Orthopedics*, all outside the submitted work. The other authors declare no conflict of interest.

#### REFERENCES

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2. **Siddiqui AA, Abousamra O, Compton E, Meisel E, Illingworth KD.** Titanium elastic nails are a safe and effective treatment for length unstable pediatric femur fractures. *J Pediatr Orthop* 2019 November 02. (Epub ahead of print)

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