

# Maximal Force Generated by Magnetically Controlled Growing Rods at Different Rod Length Decreases with Rod Lengthening

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# Disclosure

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- \* Hillard T. Spencer
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- \* Reginald Fayssoux
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# Introduction

- \* Magnetically Controlled Growing Rods (MCGR) has been met with great enthusiasm by surgeons managing early onset scoliosis
- \* The new devices offer the potential to decrease the cost and morbidity associated with repeated lengthening surgeries
- \* One of the potential negative consequences of traditional growing rod treatment is the law of diminishing returns
  - \* Cause of this phenomenon is unknown and may be multifactorial.
  - \* Strength of the lengthening mechanism in the MCGRs as it lengthens may have an impact on the length gained with each subsequent lengthening of the MCGR.



# Objective

- \* To evaluate the maximal force generated by MCGR at 3 different lengthened positions.



# Method

- \* 12 MCGRs (90mm actuator length) were obtained
- \* Maximal force generated at different distracted lengths tested with force testing machine
- \* Maximal lengthening force measured in pounds of force
- \* Expansion length of 0mm, 25mm and 40mm.
- \* Longitudinal analysis was performed using mixed effects linear regression to account for repeated measures and variability between individual implants.





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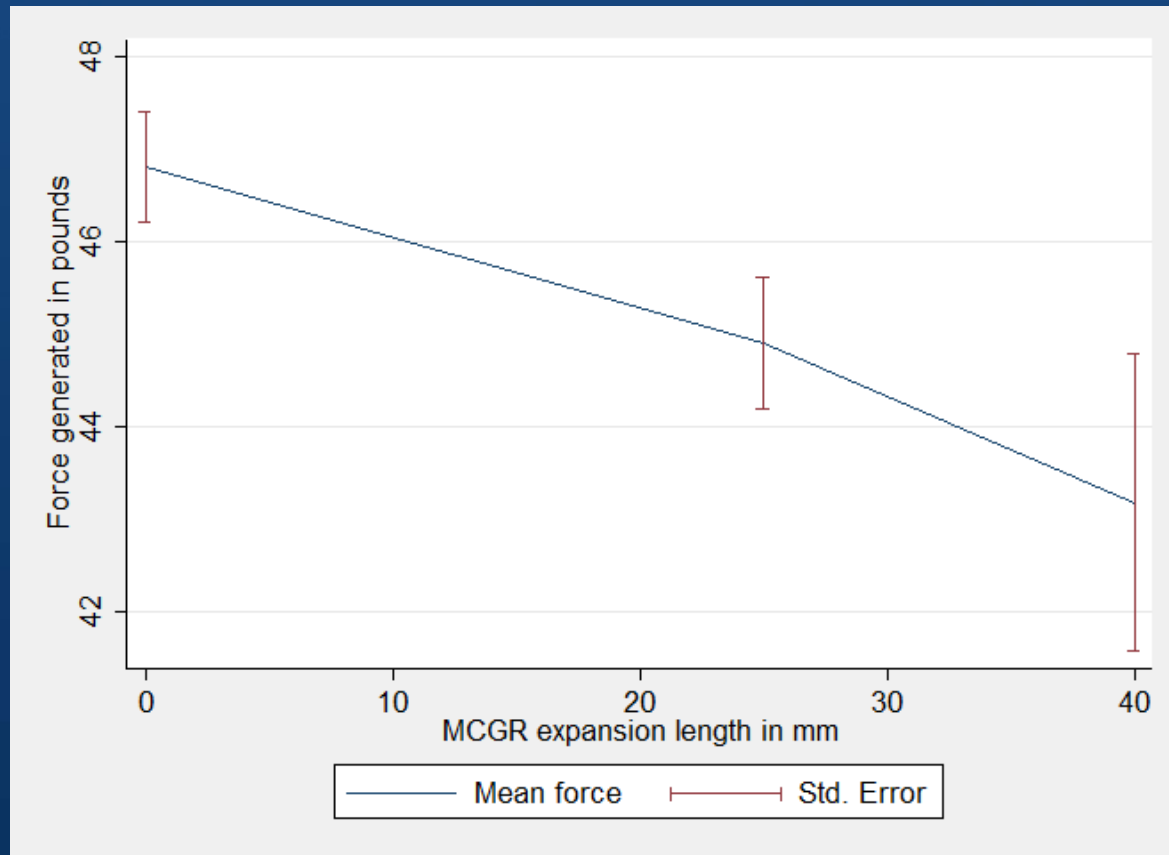


# Results

| Actuator Length | Avg. Max Force Generated (lbs) | Std. Dev.              |
|-----------------|--------------------------------|------------------------|
| 0               | 46.8                           | 2.06 (range 43-50)     |
| 25              | 44.9                           | 2.48 (range 39.4-49.5) |
| 40              | 43.2                           | 5.56 (27.3-49.1)       |



# Mixed Effects Linear Model



Avg. decrease of 0.089 pounds per mm of lengthening  
(95% CI, 0.030-0.148;  $p=0.003$ )





# Conclusion

- \* There is a small but statistically significant decrease in the maximal force generated by MCGR as the rods are lengthened.
- \* The decrease in force generated may result in diminished spine length gained with each subsequent MCGR lengthening.
- \* Despite the reduction in the number of invasive surgical procedures for lengthening, the decreasing force generated by MCGR may contribute to the diminishing returns



# Thank You



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