Introduction

- Early onset scoliosis (EOS) is defined as a spinal deformity that occurs before 10 years of age.
- There are two commonly employed techniques to correct scoliosis, the forced growing rods system and the growth guidance system although both systems have their own shortcomings.
  1. Forced growing rod system: repeated invasive surgery.
- A novel self-adaptive growing rods system was designed.
- The aim of the current study is to validate the self-adaptive growing rods system would allow adequate spinal correction without the need for revision surgery.

Materials and Methods

- The designed self-adaptive growing rods allows the free axial expansion of the rods, but at the time constrains the implant against axial compression and lateral shear force.
- Implant the self-adaptive growing rods system into 4 6-month old swine and follow up for 12 weeks.
- X-rays were on the 1st and 12th week after the implantation (Fig.1).
- In-vivo expansion of the growing rods system was determined by radiography.
- Changes of vertebral unit height and lengthening of the rods were measured and compared.

Results

- 4 in-vivo tests were completed.
- One swine was sacrificed due to wound infection. The rest three swine survived the 12-week observation period without complications.
- The radiographs showed the elongation of the growing rods ranged from 10 to 15 mm, which were equally distributed to the instrumented levels and indicated to be comparable with the growing of VUH.
- Average of freely lengthening levels between two instrumented levels and the control level of VHU were similar.
- In terms of the integrity of the device, some screw or crosslink were slightly loosed but was considered to be clinically acceptable.
- Observable gunk was found within the sleeve of the device.

Conclusion

- After 12 weeks follow-up, the self-adaptive growing rods system could be lengthened with spinal growth.
- The follow up experiment validated that a novel lab-designed self-adaptive growing rods system allows spine growing naturally without restriction.

Discussion

- The device in its current form remains to be improved.
- This system may not meet the requirement for human clinical trial, however, this study proves our design concept.
- It is hoped that the transition to human applications of this system will successfully allow patients to avoid the repeated invasive surgery.

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