The effect of surgical intervention for early onset scoliosis associated with neurofibromatosis comparison between early fusion and growing rod by a single surgeon



National Hospital Organization Kobe Medical Center



Teppei Suzuki, Koki Uno, Takuto Kurakawa

Disclosure

Author Teppei suzuki Koki Uno Takuto Kurakawa Relationships Disclosed No Relationship Surgical Spine (d) Depuy Spine(d) No Relationship

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Introduction

To evaluate the effect of growth-preserving spine surgery for early onset scoliosis (EOS) in NF-1, spinal fusion (Fusion Group; FG) and dual growing rod (Growing Rod Group; GRG) were examined and compared.



Material and Methods



Demographic Parameters

Except for lumbar curve, All patients applied to GR surgery.



| Pt No | Surg. | Gender | Age at initial | Age at FFU | Location | Kyphosis>50 | indication |
|----------|-------|--------|-------------------|---------------|-----------------|-------------|--------------|
| 1 | FG | F | 7 | 15 | Single thoracic | Kyphosis | Severe Kyp |
| 2 | FG | М | 7 | 19 | Single thoracic | None | unapplicable |
| 3 | FG | F | 10 | 24 | Lumbar | None | Location |
| 4 | FG | F | 7 | 12 | Thoracolumbar | Kyphosis | Location |
| 5 | GRG | F | 8 | 19 | Single thoracic | None | |
| 6 | GRG | М | 8 | 19 | Double thoracic | None | |
| 7 | GRG | F | 2 | 14 | Single thoracic | None | |
| 8 | GRG | М | 6 | 13 | Double thoracic | None | |
| 9 | GRG | М | 7 | 11 | Double thoracic | Kyphosis | |

| | Dystrophic Features | | | | | | | | | | |
|----|---------------------|-----------|----------------------|----------|---------------------|---------|---------|------------------|------------------|-------|--|
| | Abubakar; Spi | | | | | | | | <u>ine, 20</u> | 000 | |
| Dt | | 1 Dih | 2 Transverse | 3 | 4 | 5 (| Dural | 7 Para- | 8 Short | | |
| No | Surg. | penciling | process spindling | rotation | scalloping | wedging | ectasia | spinal tumors | segment curve | Total | |
| 1 | FG | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 8 | |
| 2 | FG | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 8 | |
| 3 | FG | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 7 | |
| 4 | All | atients | were | classif | ied ¹ as | havin | a dvst | ronhic | c urve | 8 | |
| 5 | GRG | 1 | 1 | 1 | 1 | 1 | | | | 7 | |
| 6 | GRG | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 8 | |
| 7 | GRG | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 8 | |
| 8 | GRG | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 8 | |
| 9 | GRG | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 8 | |

Surgical Data

| | / 1 1 | | 2 | Ð | ±: | 11 | | | |
|---|--------------|----|-----|----|-----|------|-----------------------------------|--|-------------------------|
| | | | | | | | Additional surg (augmentation) | Complication | Total No of surg. |
| | Ő. | | A | | | H | Ant(2)+Post(4) | Myelopathy due to severe kyphosis PJK | 7 |
| | | | 6 5 | | | F- | Ant(1) | The mean no of total surg. | 2 |
| ľ | | | | 12 | | E A | Post(1) | in FG was ${f 4}_{\pm 2.6}$ | 2 |
| 4 | FG | An | - | | 1-6 | 38) | Ant(1)+Post(2) | Dislocation due to intrathecal tumor and sacroiliac joint subluxation | 4 |
| 5 | GRG | GR | 8 | 19 | 10 | Done | None | | 12 |
| 6 | GRG | GR | 8 | 19 | 12 | Done | None | | 14 |
| 7 | GRG | GR | 2 | 14 | 16 | Done | Post(1) | Infection, PJK, malalignment, Resorption due to dystrophic | 17 |
| 8 | GRG | GR | 6 | 13 | 10 | None | None | The mean no of total surg. | 11 |
| 9 | GRG | GR | 7 | 11 | 4 | None | None | in GRG was 11 ±4.7 | 5 |

Main curve



Truncal height (T1-S1 length)





Case presentation no7 2y.o. Female

GRG (growing rod group)





Discussion



High risk of pseudoarthrosis

Winter; JBJS1979

<u>Sirois; JPediatrOrthop1990</u> Combined anterior and posterior fusion was recommended

Parisini; Spine1999

Early fusion does not lead to significant truncal height loss, if the curve is short. <u>Weinstein</u>

Weinstein; Spine1997

However in the case of double curve or severe kyphosis, it may be difficult to save the growth potential.

Discussion

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There is very scant literature on fusionless treatment for NF 5NF/ 23cases of multicenter database Suken A; Spine2014 1NF/ 14cases of MCGR Akbarnia; Spine2013

2NF/ 23cases of single rod GR Grregi T; Stud Health Technol Inform. 2012

GR maintained the initial correction and allowed spinal growth.

The problem is not curve progression but resorption of the vertebral bodies at fusionless area.

> Augmented (anterior) fusion is recommended in case of these dystrophic changes

GRG (growing rod group)

Th5

Conclusion

- 1. Growing rod technique maintains correction achieved at initial surgery while allowing spinal growth to continue in the treatment of scoliosis in NF-1 patients.
- 2. Once progressive dystrophic change develop, augmented spinal fusion should be indicated even if during lengthening period.

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