CERVICAL SPINE RESEARCH SOCIETY

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Novel Cervical Instrumentation Procedure For Severely Unstable Cervical Lesions: Three-rod Fixation Technique

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Disclosures

- I declare that I have no conflict of interest in connection with this paper.

Introduction & Background

- ✓ Posterior cervical decompression and fusion is effective for cervical lesions with deformity or instability.
- ✓ However, fixation with 2 rods are sometimes considered insufficient for the cases with severely unstable spine.
- ✓ We have performed posterior cervical fusion with sterically disposed 3 rods to gain more stability for severely unstable cervical lesions.

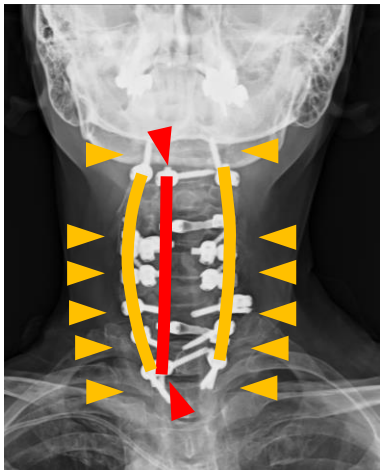
Kumagai N, Kaneyama S, et al. CSRS-E 2018

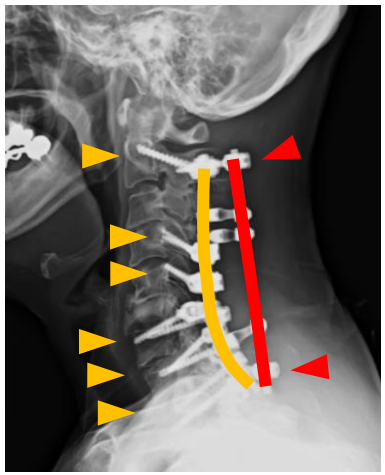
Materials and Methods

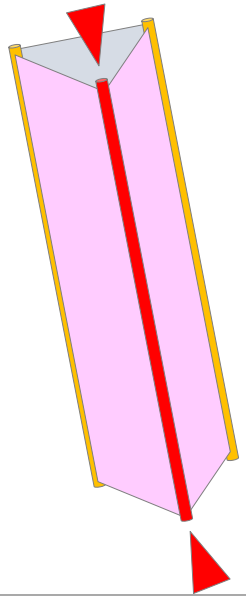
8 patients

- Cervical myelopathy with severe instability
- Posterior decompression and 3-rod fixation

- ✓ Male/Female: 5 patients/ 3 patients
- ✓ Age: 63.5±13.6 y.o. (49-86 y.o.)
- ✓ Follow-up period: 3.9±1.0 years (2.0-5.3 years)







Radiological evaluation

- C2-7 angle
- C2-C7 SVA
- Cervical tilt

evaluated at pre- and post-operation, 3 month and 1 year after surgery and final f/u

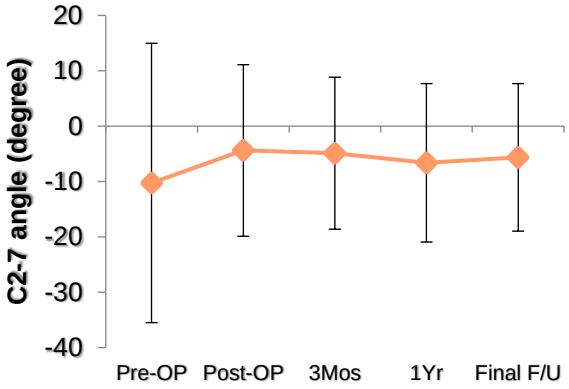
Surgical Procedures

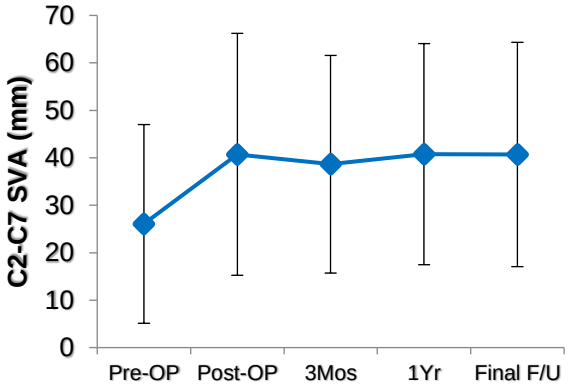
1) conventional 2-rod posterior cervical instrumentation was set,
2) lamina screws and a satellite rod were placed to connect C2 and DIV,
3) 3 rods were connected with several transverse connecters.

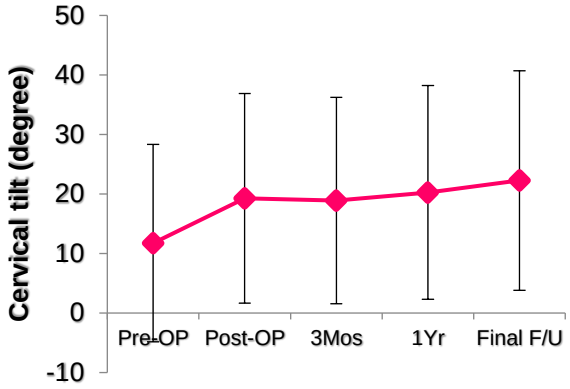
Then, the rods were arranged in triangle to form three dimensional triangular prism.

Results

- ✓ OP time: 353.9±91.2 min. (236-497 min.)
- ✓ Blood loss: 391.0±299.9 ml (51-860 ml)
- ✓ Complication: Upper limb palsy; 1 case
- ✓ Implant failure: 0/8 cases
- ✓ Bony fusion: 8/8 cases



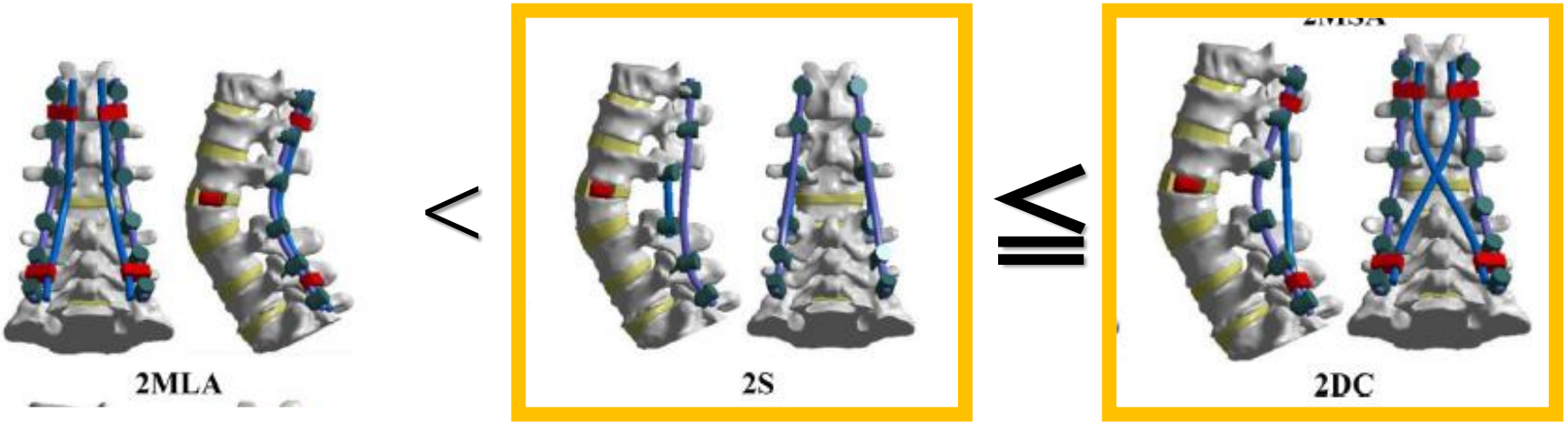




- ➢ C2-7 angle improved from -10.3 deg. before surgery to -4.4 deg. after surgery, and it was preserved -6.6 deg. one year postoperatively and -5.6 deg. in final follow-up.
- ➢ C2-C7 SVA increased 26.1mm to 40.7mm after surgery ($p<0.05$) and maintained till final follow-up.
- ➢ Cervical tilt increased gradually from 11.8 deg. to 22.3 deg. during follow up, but they did not show significant differences.

Conclusion/discussion

- ✓ 2-rod constructs < multi-rod constructs
  - Hyun SJ, et al. Spine. 2014
  - Luca A, et al. Eur Spine J. 2017
- ✓ 3-dimentional rod configurations
  - Berjano P, et al. Eur Spine J. 2019

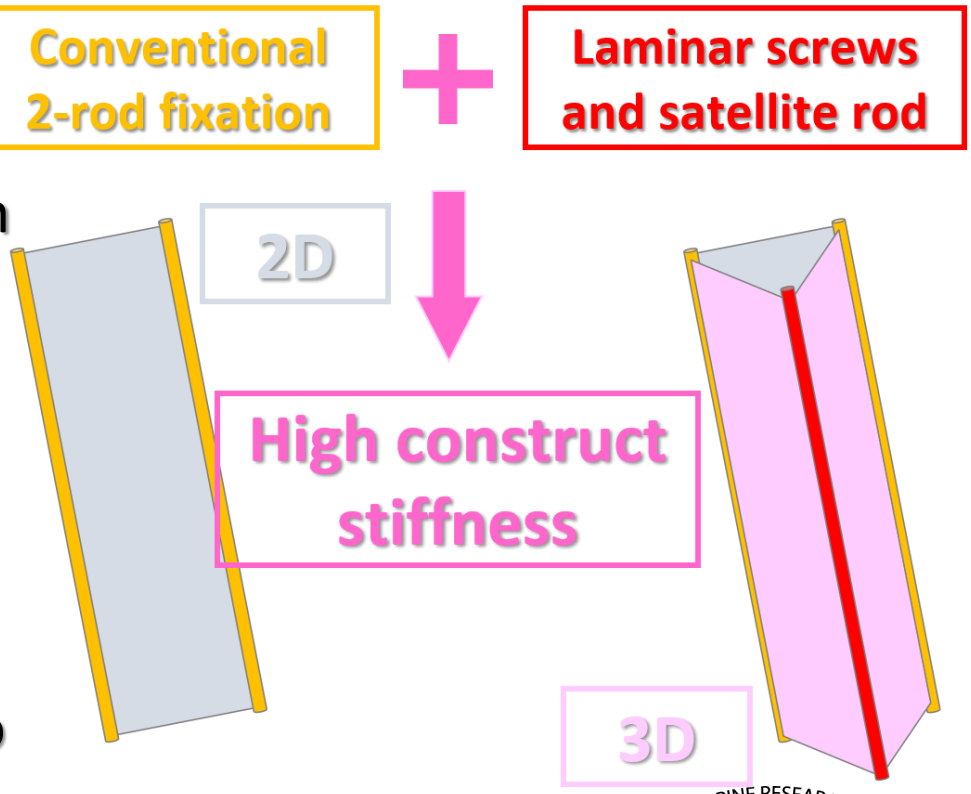


Parallel | Deep/Separated | Delta/Connected

3-dimentional multi-rod configurations is the strongest!

Conclusion/discussion

- ✓ We developed posterior cervical fixation using three sterically oriented rods (3-rod fixation) for treatment of severe cervical instability.
- ✓ This 3-rod fixation provided significant stability even for severe cervical instability, which resulted in secure bony fusion without implant failure or loss of correction.
- ✓ Our 3-rod fixation forms 3-dimentional structure, which could display stiffness against not only torsional force but also bending deflection.



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