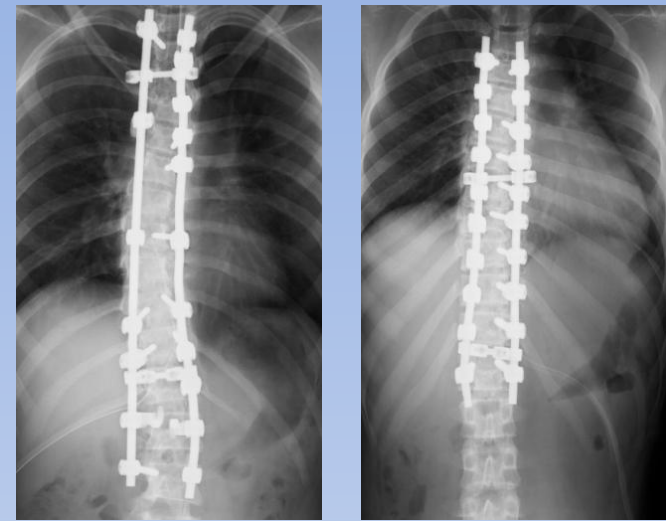


# ANALYSIS OF THE OPTIMAL SCREW DENSITY FOR CORRECTION OF ADOLESCENT IDIOPATHIC SCOLIOSIS

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## <Introduction>



- ✓ We have performed surgical correction of adolescent idiopathic scoliosis (AIS) using thoracic pedicle screw (TPS).
- ✓ We usually insert pedicle screw as many screws as possible in order to archive good correction.
- ✓ However, optimal screw density for correction of AIS is unknown.
- ✓ The purpose of this study is to analyze optimal screw density for correction of AIS based on flexibility of spinal curve.

## <Materials and methods>

### Inclusion criteria

- (1) Patients who were treated by TPS Forty patients at our department (2006/03~2010/10)
- (2) A minimum follow-up of one year.

**40 patients**

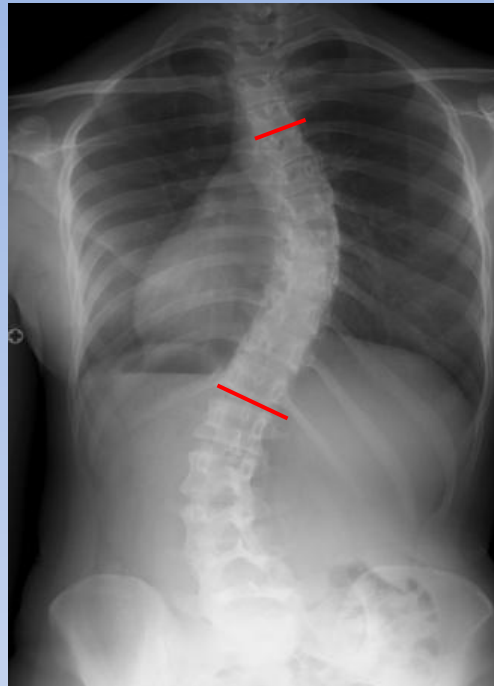
5 males

35 females

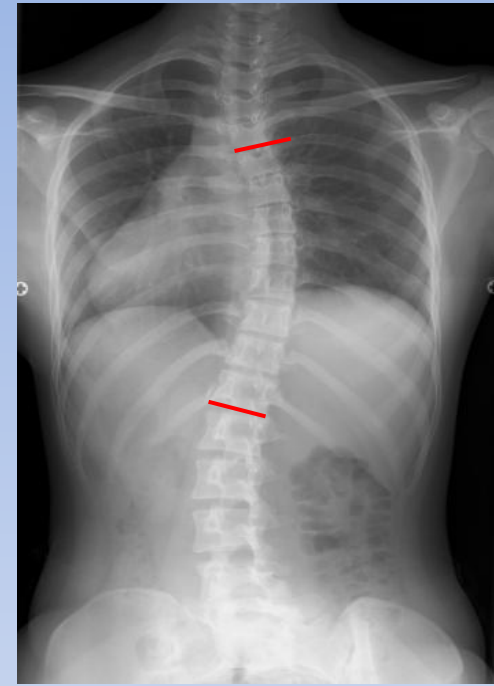
average age of 16 years at the time of operation  
(range , 13 to 23years)

# <Examination>

- Pre - and postoperative Cobb angle in the upright position
- Preoperative traction Cobb angle
- Screw density
- Rigidity of curve (RC)



preoperative  
Cobb angle



preoperative  
traction Cobb angle

Screw density : 
$$\frac{\text{number of inserted screw}}{\text{number of vertebra body} \times 2} \times 100(\%)$$

Rigidity of curve (RC) : 
$$\frac{\text{traction Cobb angle}}{\text{preoperative standing Cobb angle}} \times 100(\%)$$

# <Results>

✓ preoperative standing Cobb angle

58 degrees (range 38 to 89)

✓ postoperative standing Cobb angle

15 degrees (range 0 to 40)

The mean correction rate 75%

The average Screw density

80 percent (range, 14 to 100)

The average RC

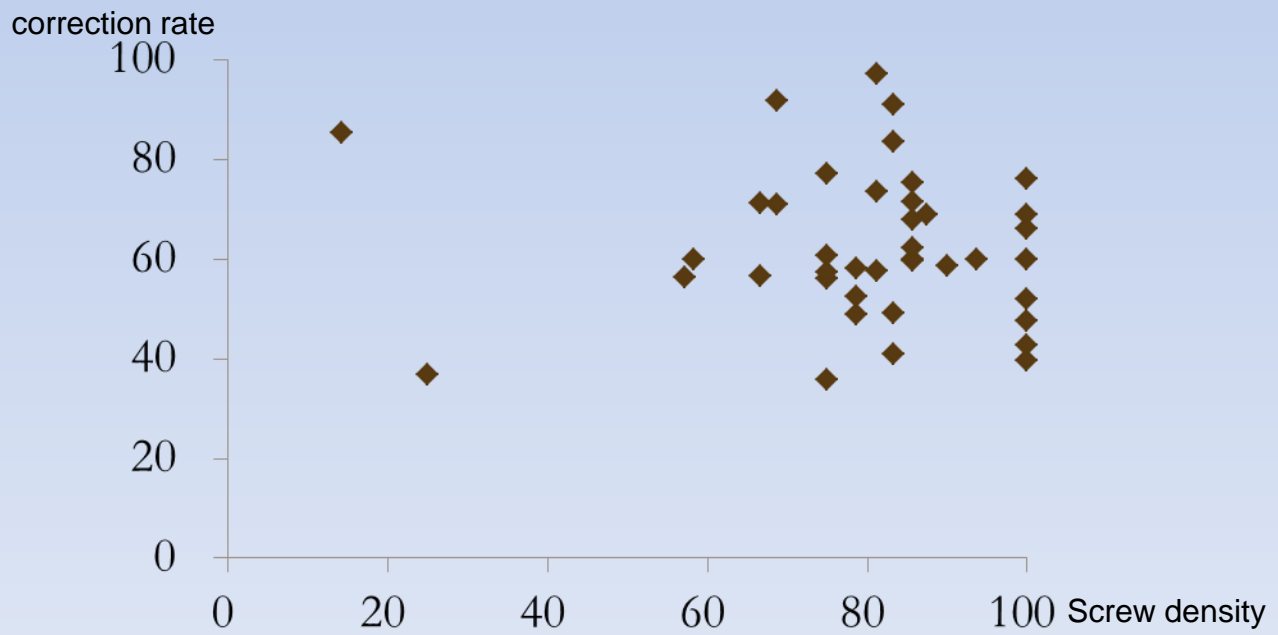
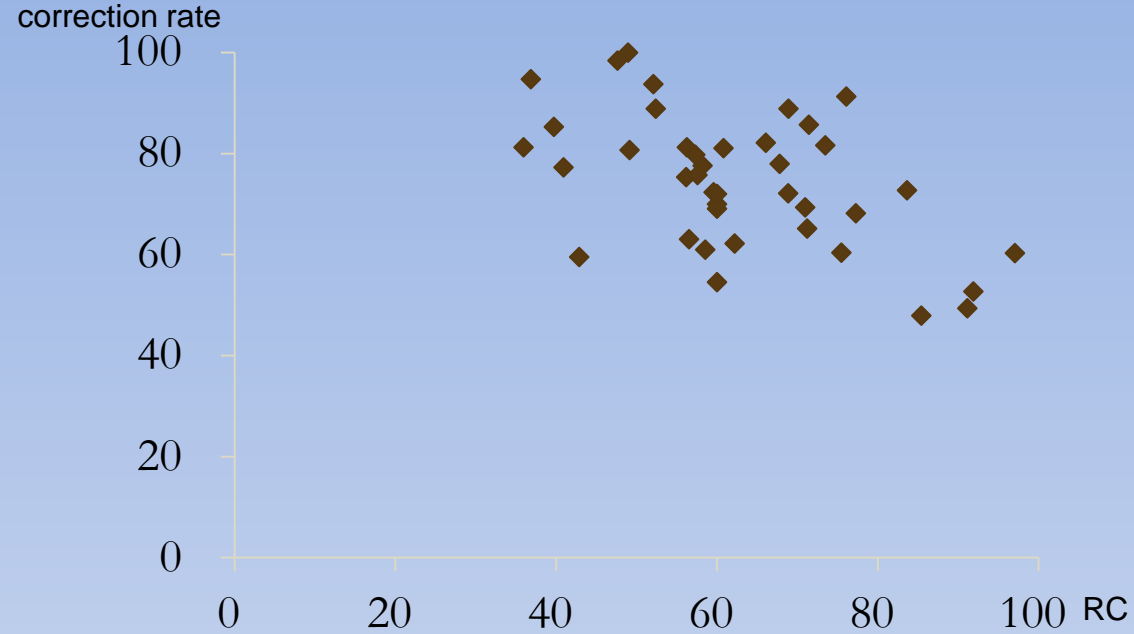
63 percent (range, 36 to 91)

Calculation of Spearman's correlations

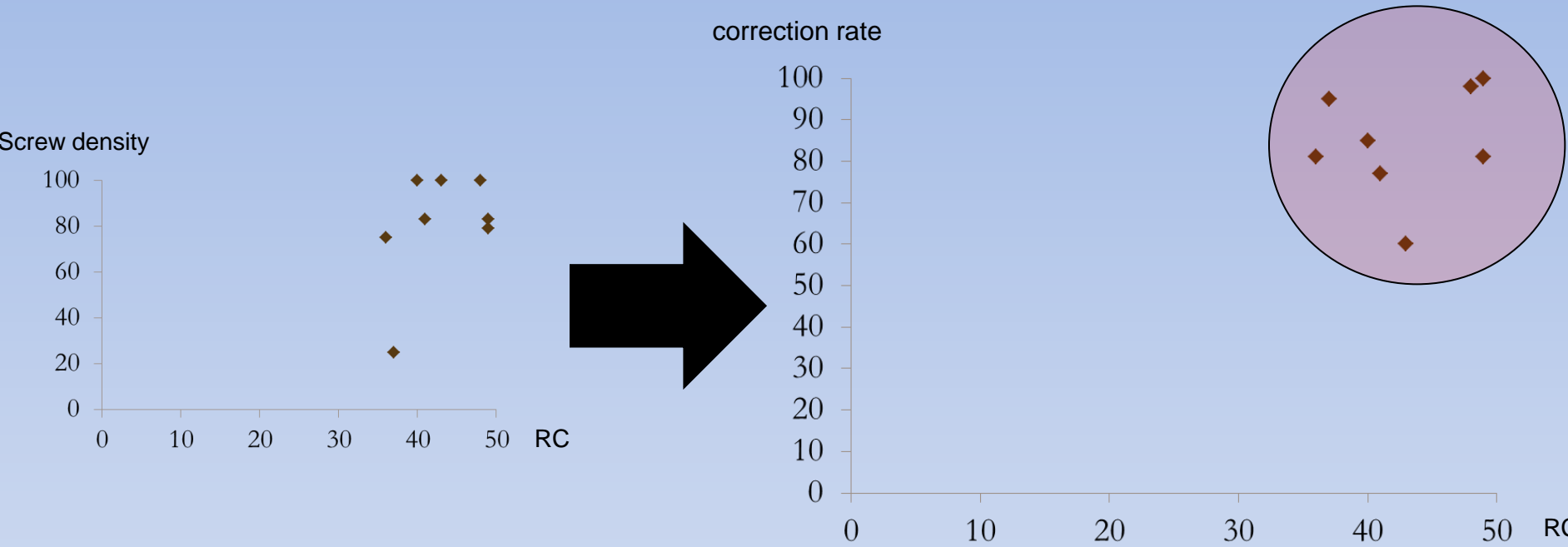
Screw density and correction rate      0.23

RC and correction rate                      0.48

# <Results>



# <Results>



Regardless of number of screws, average correction rate of patients with non-rigid curve (RC was 50 percent or less) was 85 percent.

## <Discussion>

### AIS treatment using TPS

There was an advantage in lumbar and thoracic curves to using screws compared to hook. (David H.Clements . Spine . 2009)

Pedicle screw instrumentation, although more expensive, offers a significantly better major and minor curve correction without neurologic problems. (Yongjung J.kim . Spine . 2004)

TPS is profitable for correction of deformity ,and using generally.

Optimal screw density {  
    Good correction  
    Prevention of rising medical expenses



## <Discussion>

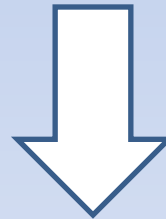
Influenced factor of correction

Screw density < Rrigidity of curve

From this srtudy

Optimal implant density chosen by surgeon should rely on a number of factors including **curve magnitude and rigidity**, **bone density**, and **desired correction**.

(Neil J.Bharucha . The Spine Journal . 2004)



It is essential to consider **preoperative Rrigidity of curve** for AIS treatment.

## <Conclusions>

- Our study demonstrates that RC correlated well and more closely with the correction rate, than did the screw density.
- Increasing number of pedicle screw did not always mean good correction.
- Patients who had non-rigid curve (RC: 50percent or less) can be treated with fewer pedicle screws.

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