



Distal Pedicle Screw Migration in Growing Rods. Does it really happen?

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Background

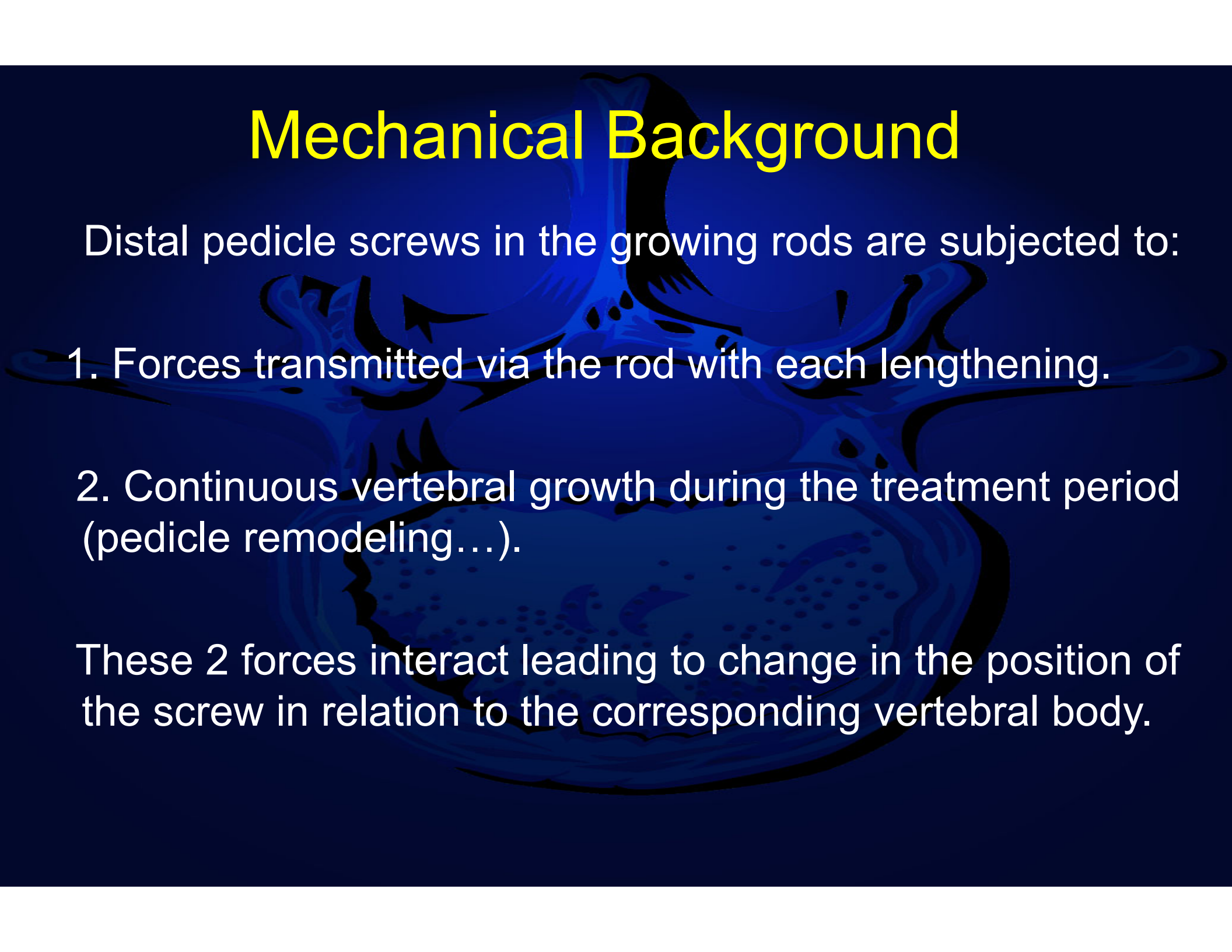
- Pedicle screw: “Inferior Drift”, “Distal Migration”, “Downward Displacement”.
- Pedicle: “Elongation”, “Shift”.

Are different terms trying to describe a change of position in relation to the vertebral body with growth

Explanation?!

- Biological plasticity
- Growth remodeling
- Implant failure

Mechanical Background



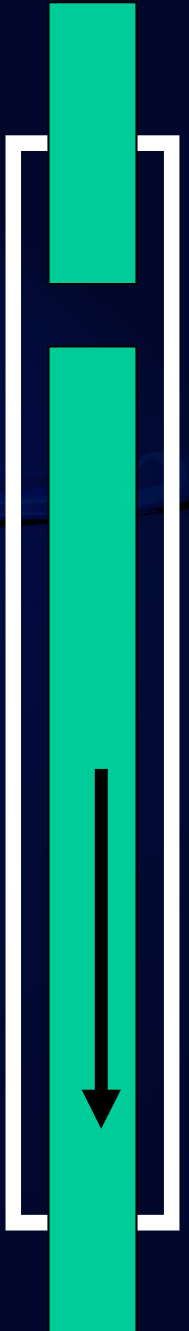
Distal pedicle screws in the growing rods are subjected to:

1. Forces transmitted via the rod with each lengthening.
2. Continuous vertebral growth during the treatment period (pedicle remodeling...).

These 2 forces interact leading to change in the position of the screw in relation to the corresponding vertebral body.

Material & Methods

- 23 cases of EOS
- Different etiologies
- Single rod
- Proximal hooks and distal screws constructs
- Serial distraction every 6 months



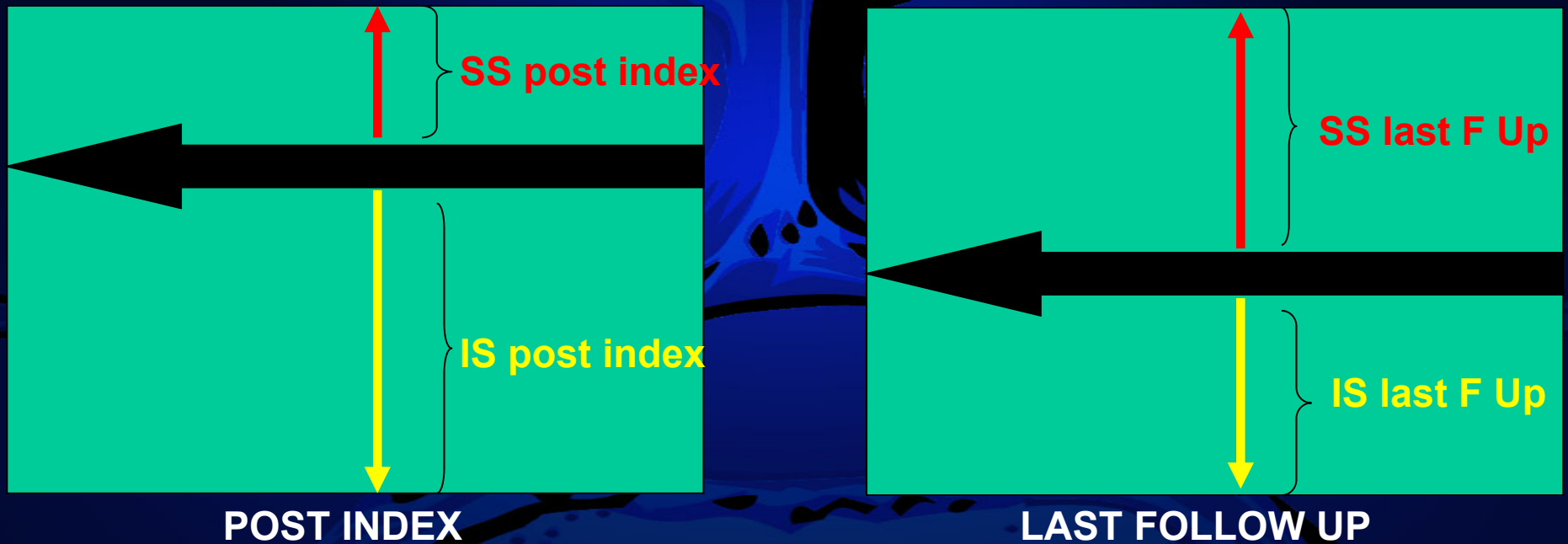
Material & Methods

- Retrospective Radiographic Review
- Age at index 6y 4m (4y 2m to 8y 9m)
- No. of Distractions 6 (4-11)
- Post index and latest F Up Xrays

Radiographic Prerequisites

- True Lateral View with the end plates as single line.
- Optimal initial position of the screws within the pedicle (AP and Lat)

Measurement RATIO



Upper end plate to Superior border of the screw = **SS**

Lower end plate to Inferior surface of the screw = **IS**

Post index ratio of SS / IS %

Last F Up ratio of SS / IS %

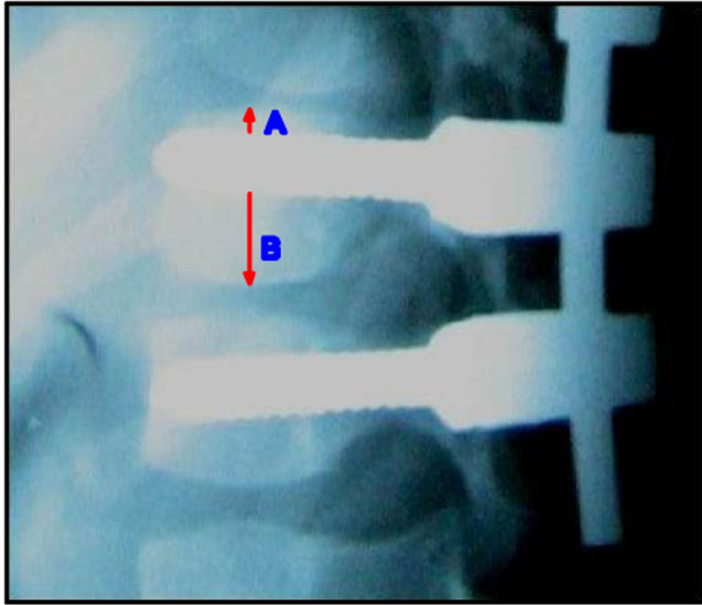
Increase % = more caudal position of the screw.

Any increase of less than 10% between post index and last F Up was considered insignificant (trying to account for any radiographic and measurement inaccuracy)

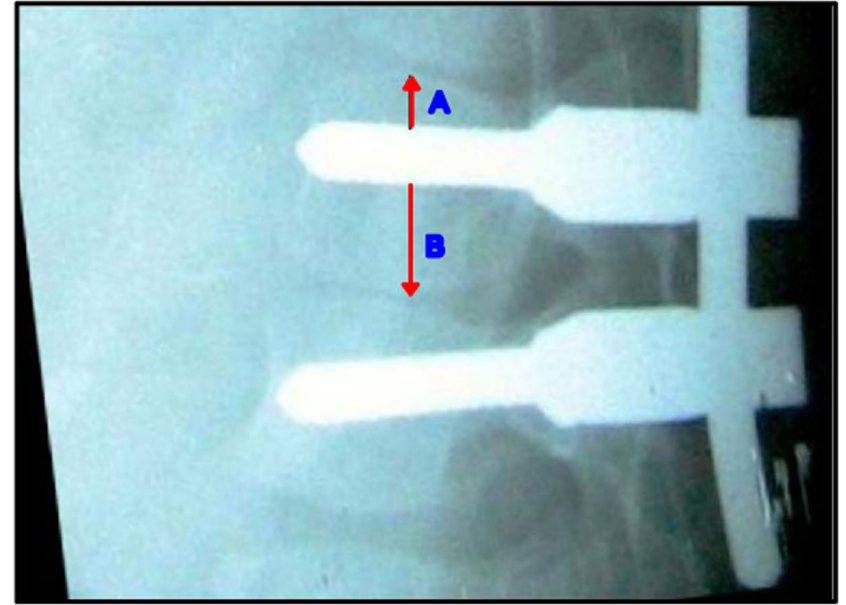
Results

- Seven cases were excluded:
 - Radiographic pitfalls 5
 - Initial non optimal position of the screw 2
- Six cases had less than 10% changes and were considered insignificant.
- Ten cases more than 10% changes
 - 5 between 10 and 50%
 - 3 between 50 and 100%
 - 2 more than 100 %

Case 1



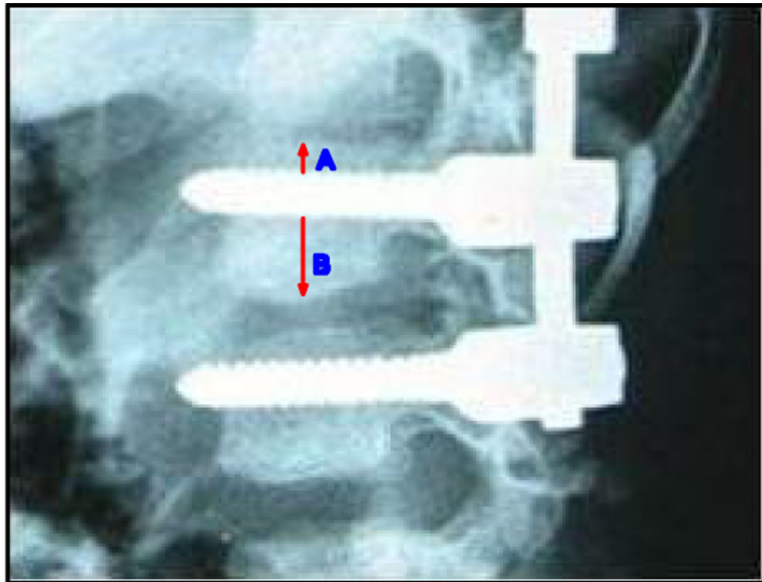
$$A / B = 0.22$$



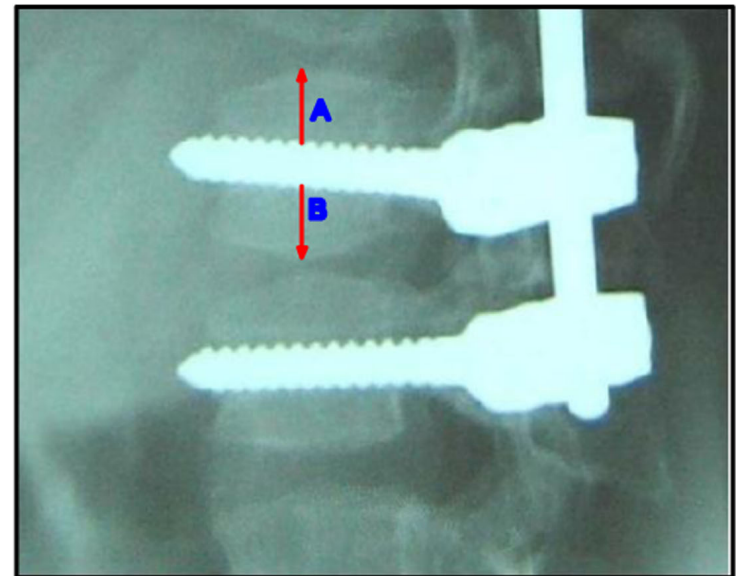
$$A / B = 0.42$$

91%

Case 2



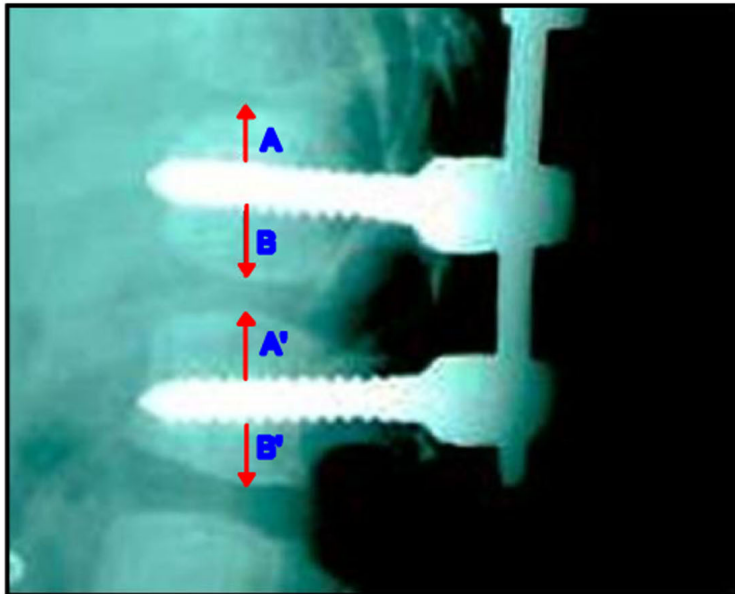
$$A / B = 0.32$$



$$A / B = 1$$

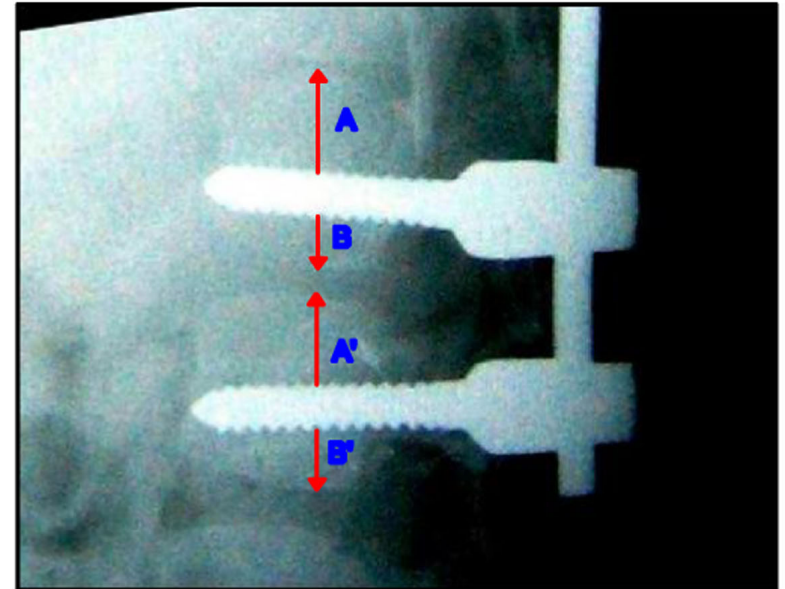
147%

Case 3



$$A / B = 0.77$$

$$A' / B' = 1.1$$

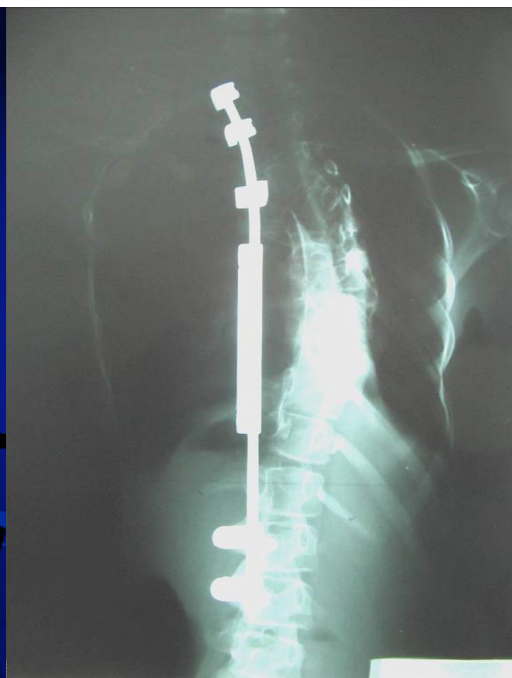


$$A / B = 2$$

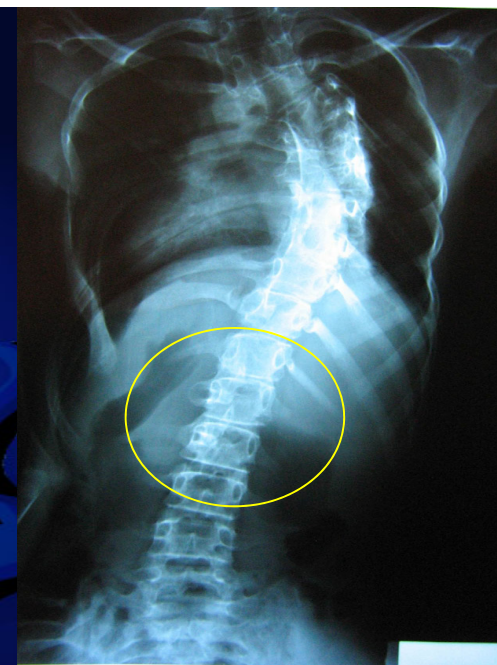
$$A' / B' = 1.5$$

159%

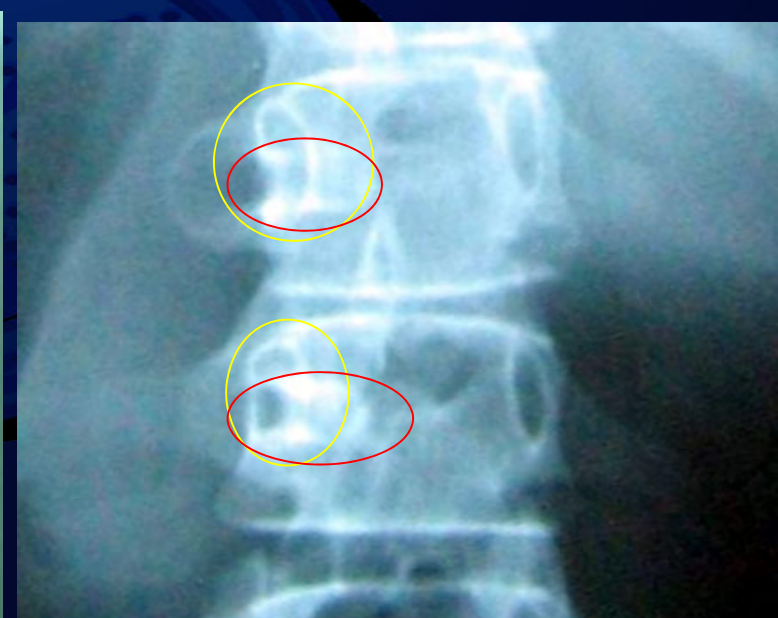
36%

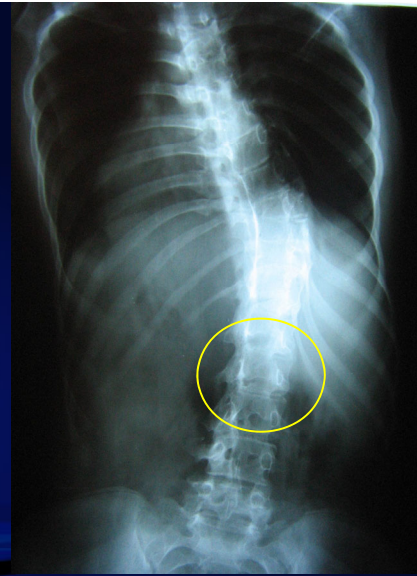
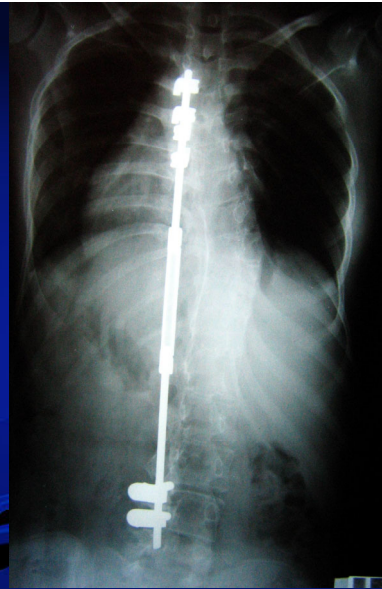
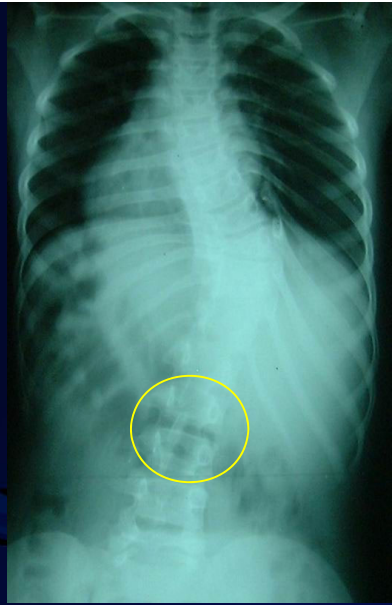


Case 4

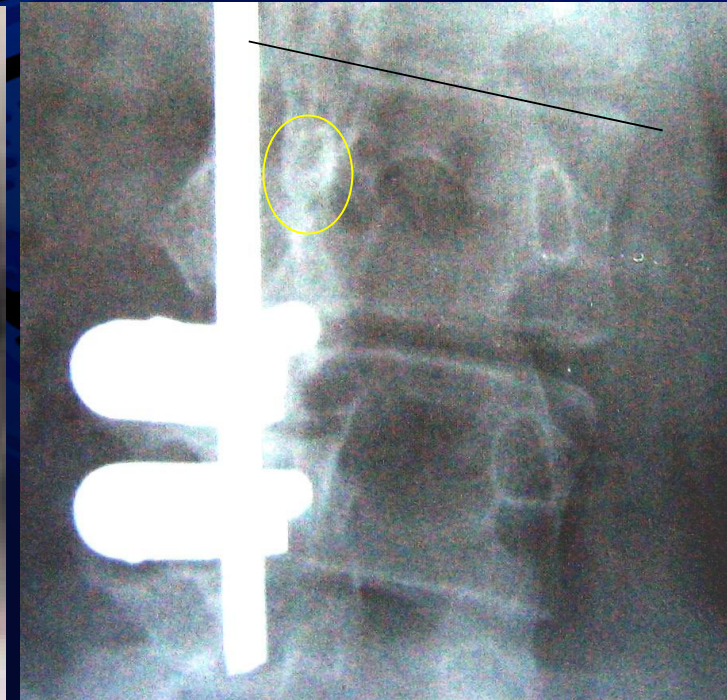


Type I





Type II



Conclusion

- “Distal Screw Migration” in single growing rods do exist with a significant incidence and degree of displacement.
- Apart from radiographic screw loosening and weakening of distal fixation there were no adverse outcome directly related to screw migration.

Conclusion

Apparently there are 2 types of distal screw migration:

Type 1: Within the pedicle with pedicle elongation or displacement.

Type 2: Through and distal (outside) to the pedicle.

A stylized, monochromatic blue illustration on a dark blue background. It depicts a splash or fountain with a central vertical column of water rising from a circular base. The base has a textured, dotted pattern. The water splashes outwards in several directions, creating a sense of movement. The overall style is graphic and modern.

Thank You