Prior instrumentation and fusion method at the anchor sites for secure application of the growing rods

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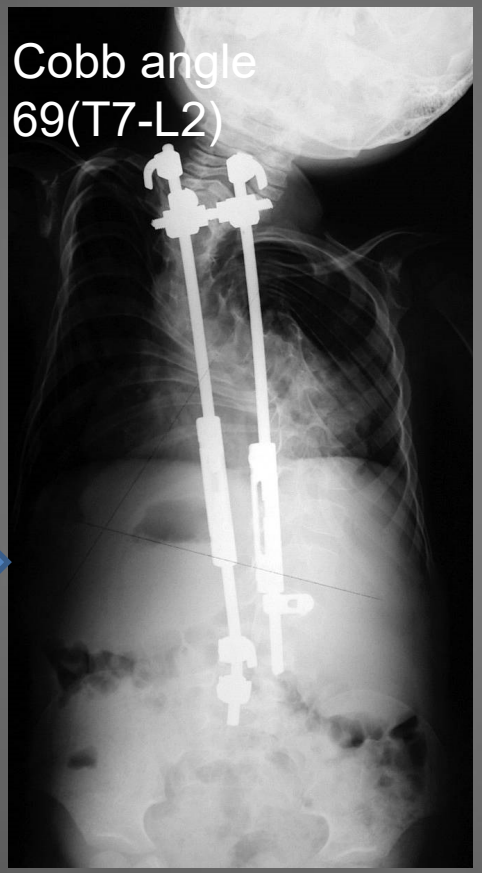
background

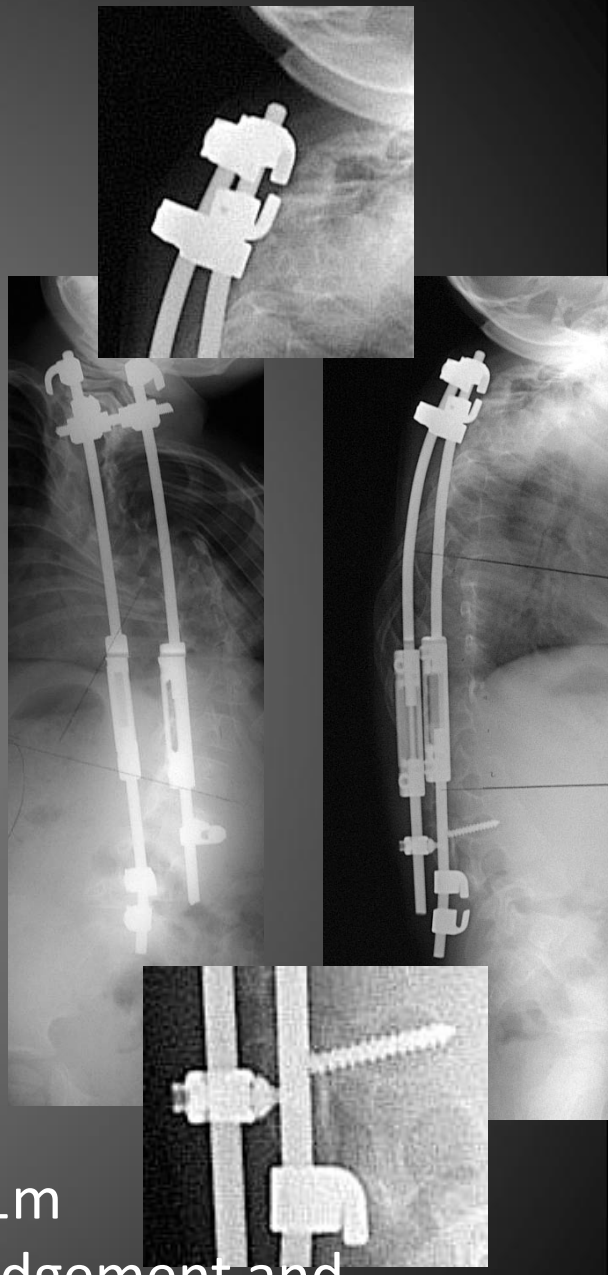
- Dual growing rods are stronger than single rods, and provide better initial correction and maintenance of correction.

  (Thompson G.H. 2005 Spine)
- Mean scoliosis improvement using dual growing rod technique was from 82 degrees to 38 degrees.

  (Akbarnia B. A 2005 Spine)
- Complication rate due to immature and fragile posterior elements such as hook dislodgement or screw pull out is still high.

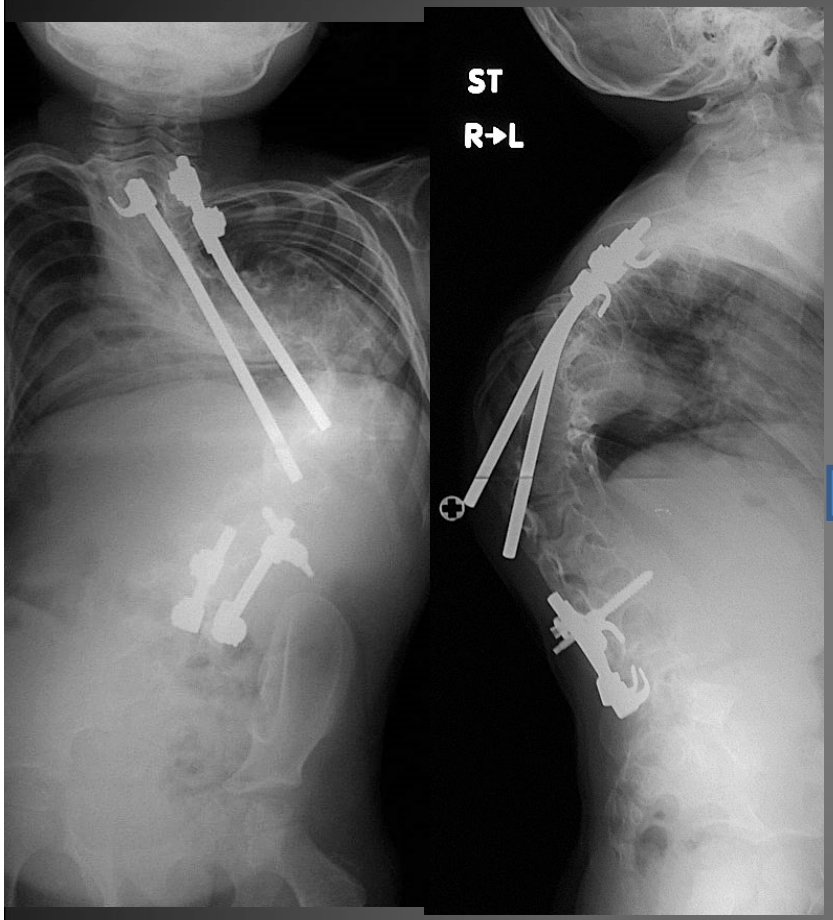
background



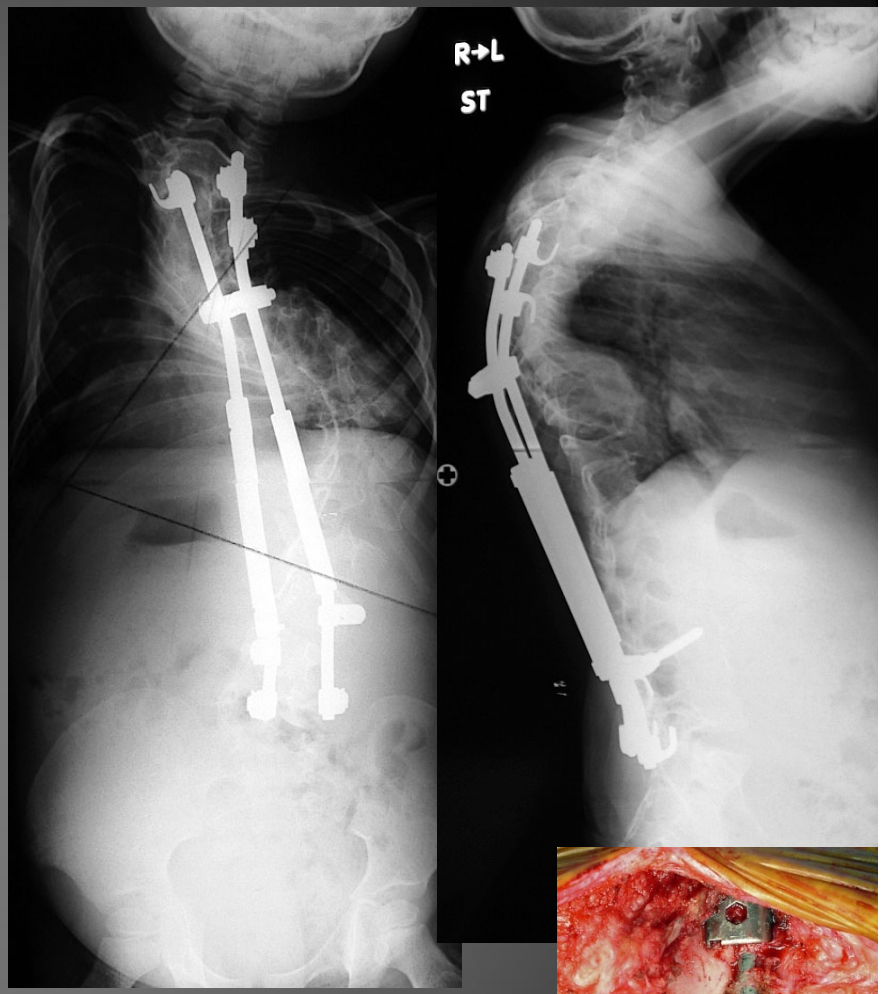


3y11m male
Ehlers-Danlos syndrome

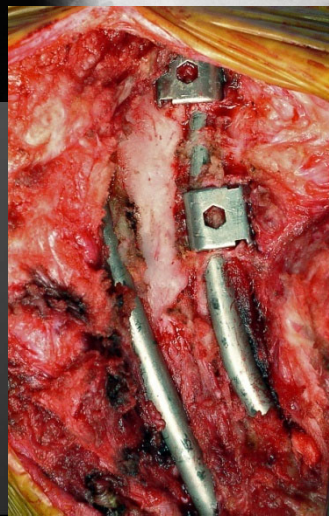
4y11m
Hook dislodgement and
Screw breakage



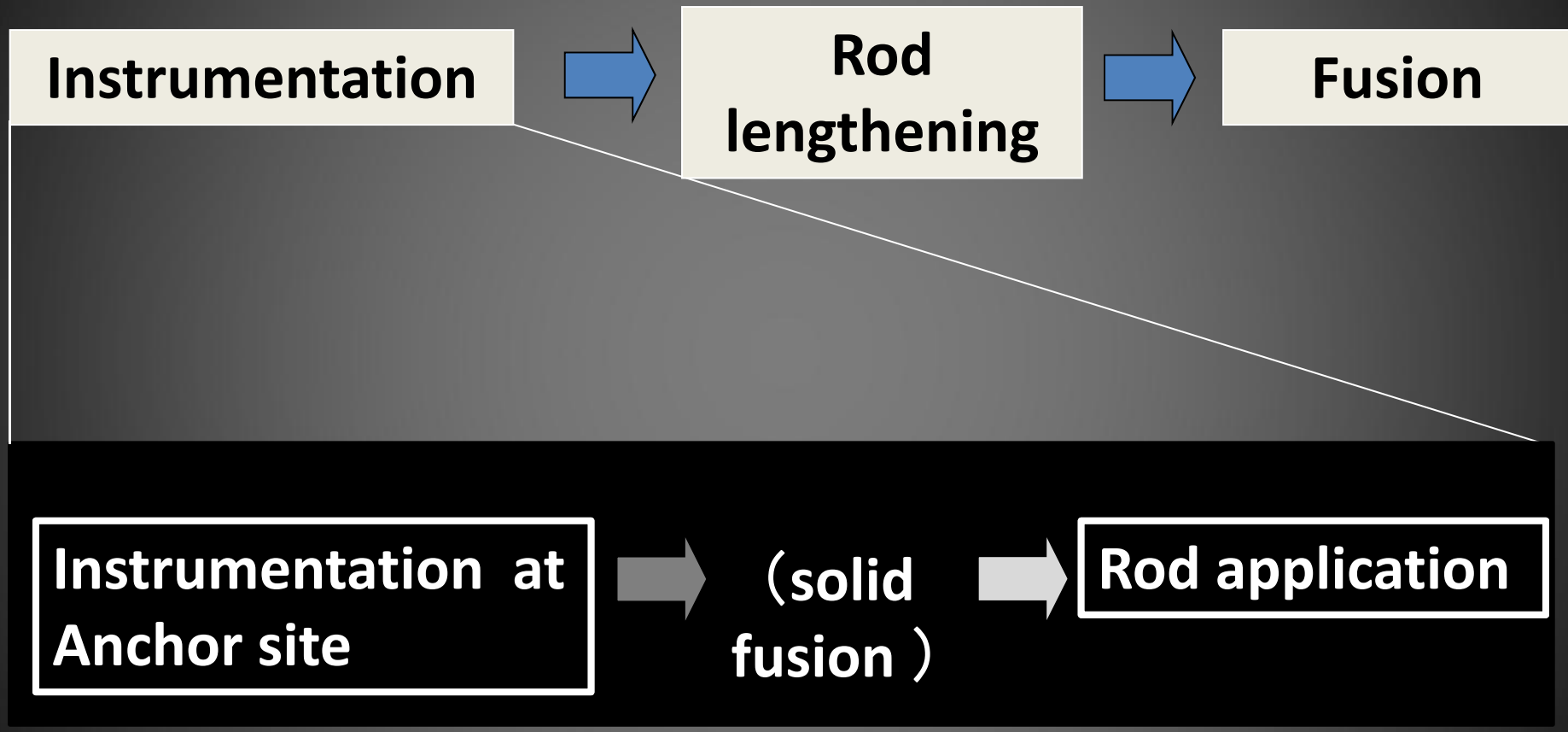
5y1m
Fusion surgery
at the Anchor site



6y6m　Rod connection
Cobb angle　68（T7-L2）



Instrumentation without fusion



Method-surgical procedure

- 1st surgery:
  - Proximal and distal anchor sites are exposed.
  - Patients undergo one- or two-level instrumentation and fusion.
- 2nd surgery:
  - After the fusion mass becomes mature and solid, usually 3 to 6 months after initial surgery.
  - Previous screws and hooks will be replaced with thicker ones if necessary.

cases

case	diagnosis	age	sex	Cobb angle
1	Neuro-fibromatosis	6y3m	M	74(T3 –T7) /72(T7 –T12)
2	Ehlers-Danros syndrome	5y1m	M	147(T7-L2)
3	CHARGE syndrome	5y2m	M	91(T7-L2)
4	Turner syndrome	7y8m	F	68(T6-T12)
mean		**6y0m**		**96**

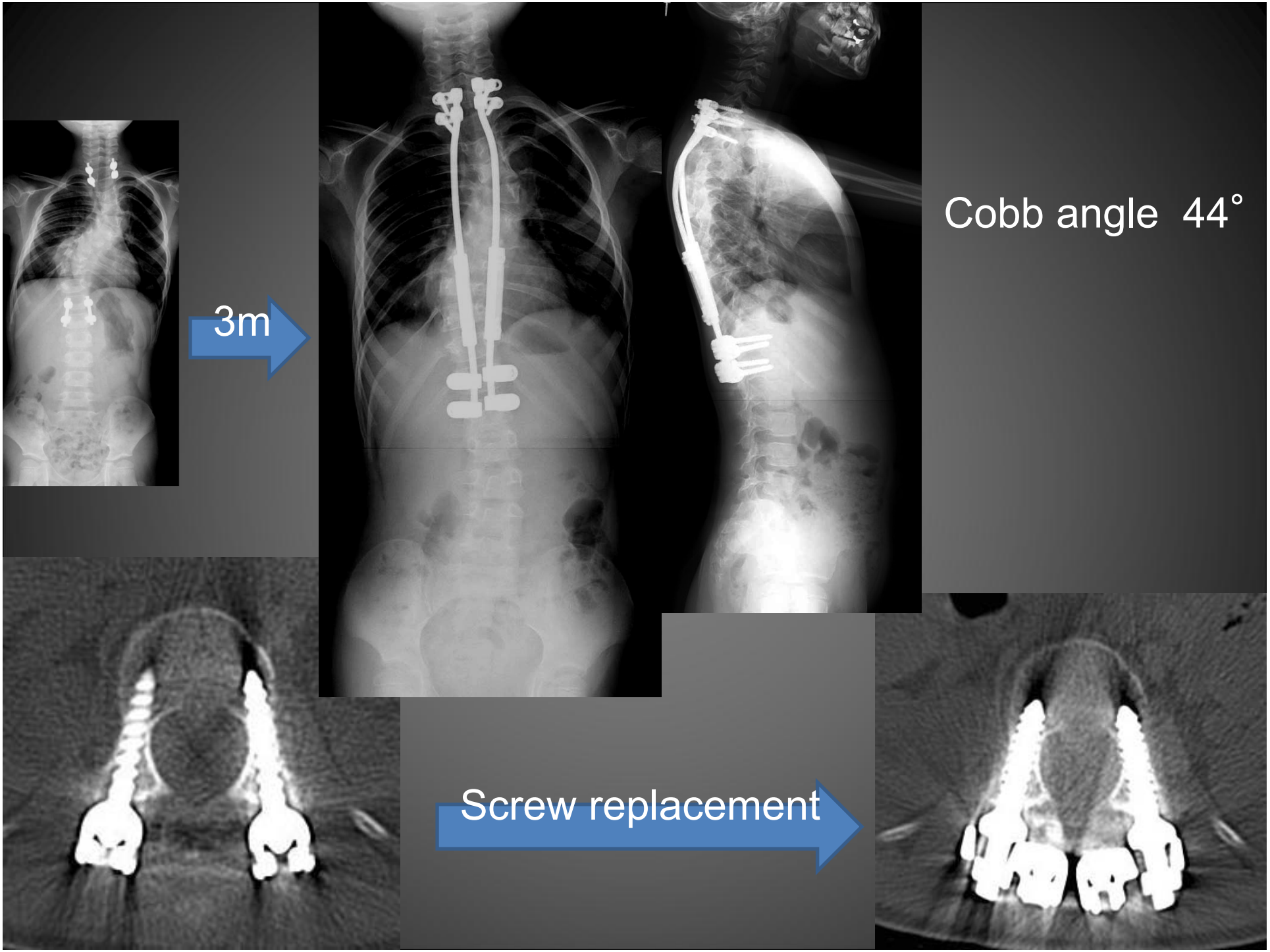
Result

- Blood loss
  - 1st surgery **170**ml (40ml-375ml)
  - 2nd surgery **222**ml(20ml-347ml)
- Operation time
  - 1st surgery **186**min(134min-243min)
  - 2nd surgery **180**min(173min-201min)
- Post operative Cobb angle : **46** degrees
- Complication and correction loss: no case

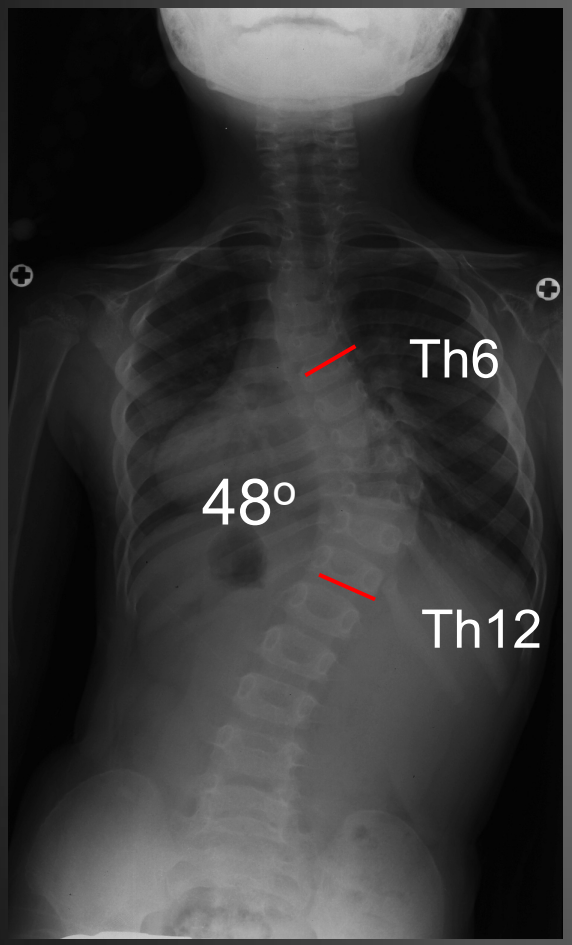
Case 1 neuro-fibromatosis

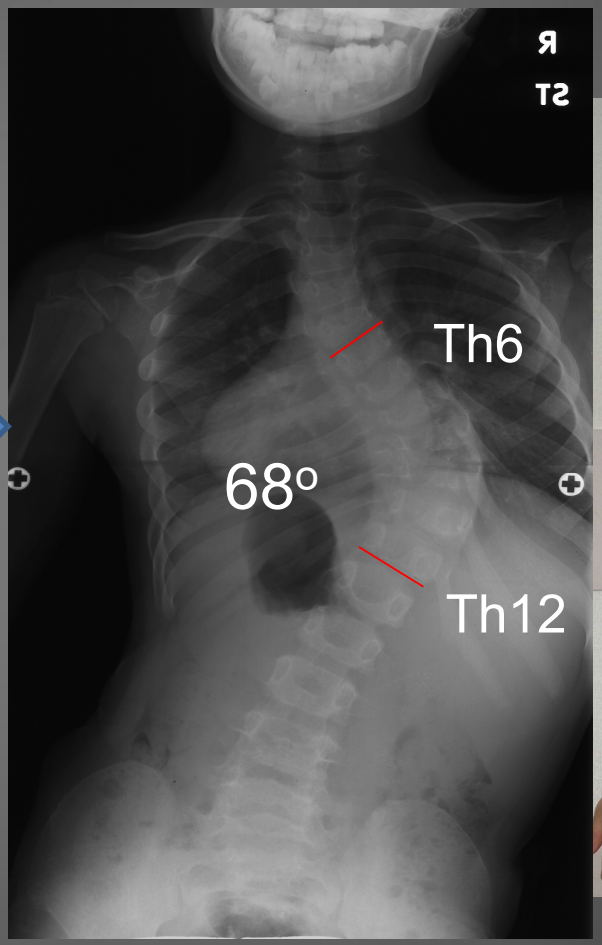
6y0m
Cobb angle 74°

T1 ,T2 , T12 and L1 pedicle screws


3m
Cobb angle 44°
Screw replacement

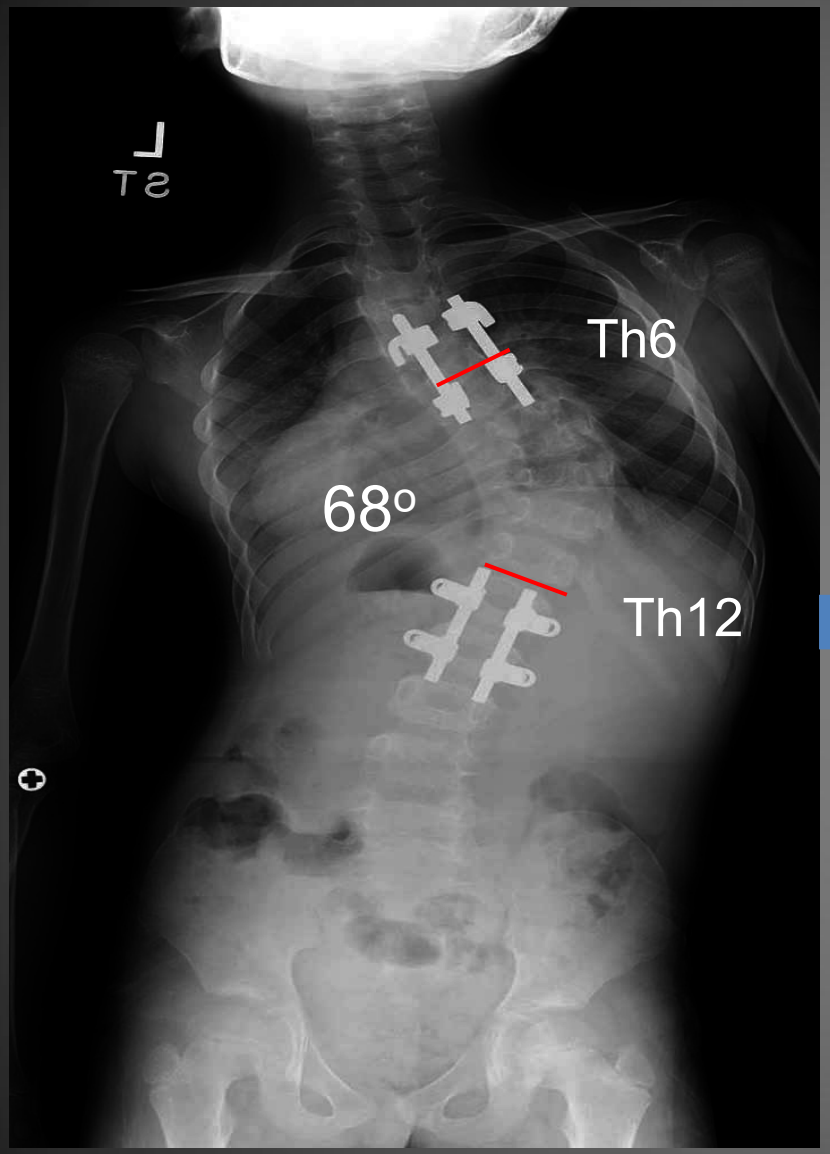
Case 4 Turner syndrome





6 yrs

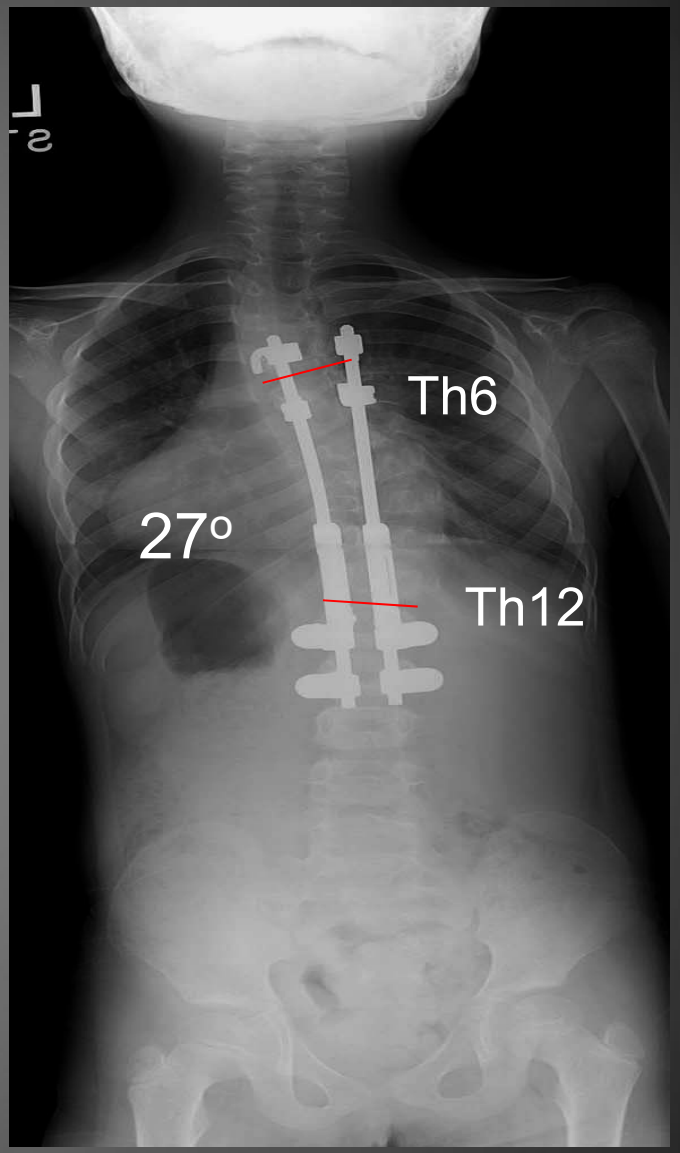
7y8m



7y8m

Anchor: Th5-6, L1-2

6m



8y2m

discussion

advantage

- Strong anchor site → strong initial correction
  lower risk of implant dislodging
- Time to assess implant position
  → avoid implant malposition
- Less bleeding and shorter operation time per operation
  → Less surgical invasion

disadvantage

- Problems associated with additional procedure (anesthetic risk, infection, etc)
- Possible curve progression between 1st and 2nd surgery

limitation

- There are no scientific data according to the pull out strength of the implants
- No comparison study was yet to be done between usual technique and prior anchor preparation technique.
- Therefore further investigations are required to prove effectiveness.

Conclusion

- Prior instrumentation and fusion at the anchor site is effective method for strong initial correction and can avoid failure

  of the posterior element of the spine , **especially when the fragility is anticipated.**


Thank you for attention