

# Growing rods can be used in patients with kyphosis!

---

Muharrem Yazici

Hacettepe University, Ankara



# Disclosure

---

- Consultancy agreement
  - DePuy JnJ
  - K2M

# Growing rod

---

- Distraction of the deformed spine by anchors on each end
- Harrington's principles on instrumentation

# Safe and effective distraction

---

- Strong fixation
- Flexible deformity

*Deforming forces should not be stronger than what the two-point fixation can withstand*

# Safe and effective distraction

---

- Strong fixation
  - Bilateral claw
  - More than two-levels fixation
  - Double rod modifications
- Flexible deformity
  - Concave rib resections
  - Additional anterior annulotomies

# Classical GR in kyphotic patients

---

- High risk of failure both during surgical correction and maintenance
  - Upper foundation hook dislodgement
  - Lamina fractures
  - Pedicle screw pull-out
    - Hook and lamina-related problems result in failure of deformity control
    - Screw pull-outs may cause grave neurologic consequences

# Kyphotic EOSD

---

- Bracing after GR
- Apical 360 degrees fusion and GR
- Posterior multilevel pedicle fixation without fusion
- Giving up GR
  - Long posterior instrumented fusion with/out anterior diskectomy&fusion and
- Modifying GR

# Kyphotic EOSD

---

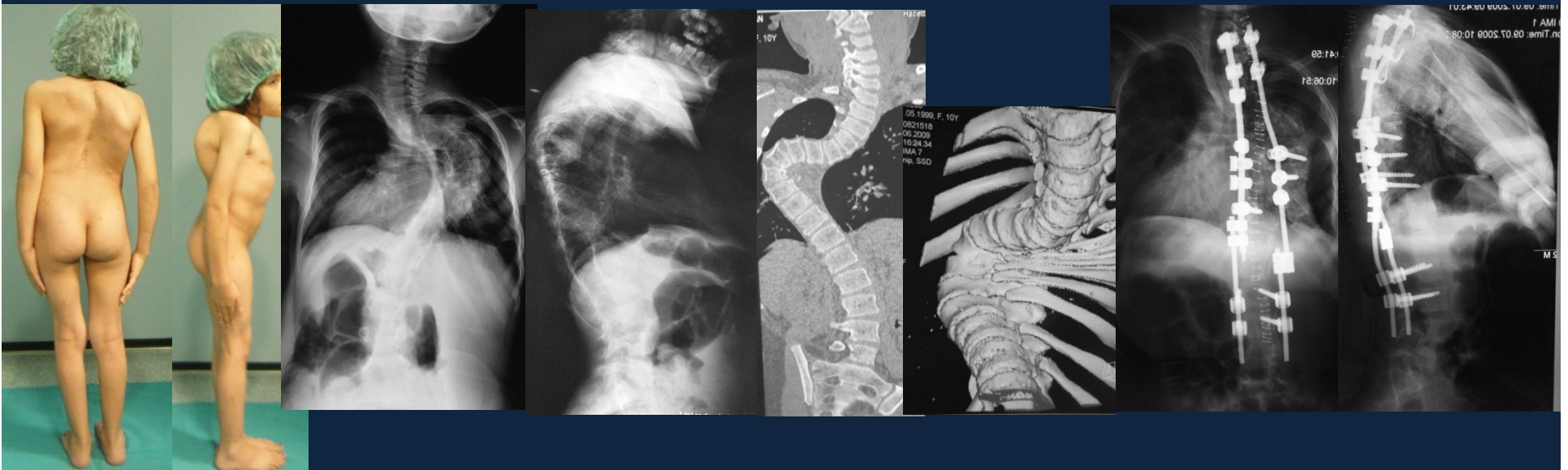
- Bracing
  - Long-term postoperative bracing often fails



# Kyphotic EOSD

---

- Apical 360 degrees fusion and GR
  - Is it still growing?



# Kyphotic EOSD

---

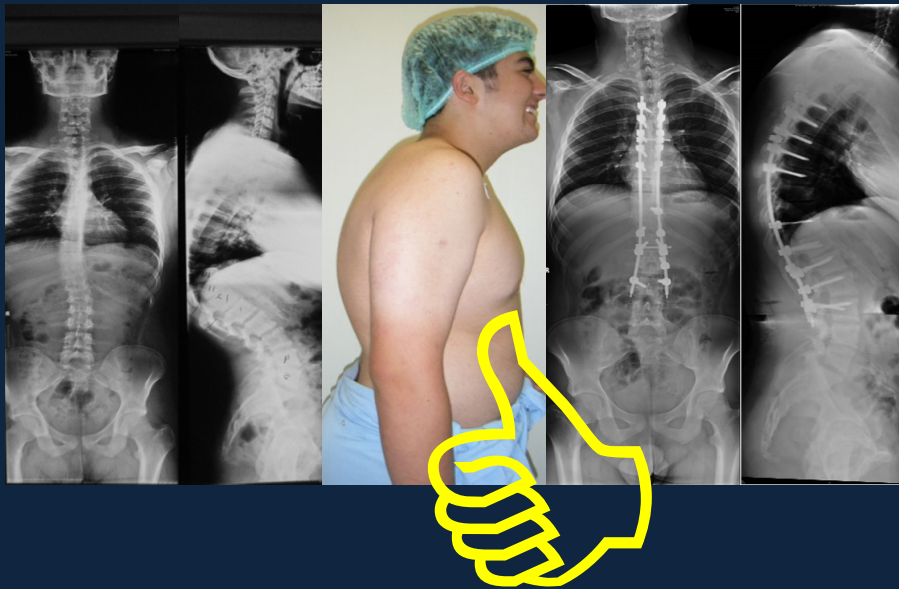
- Posterior multilevel pedicle fixation without fusion
  - Either active or passive compression results in spontaneous fusion



# Kyphotic EOSD

---

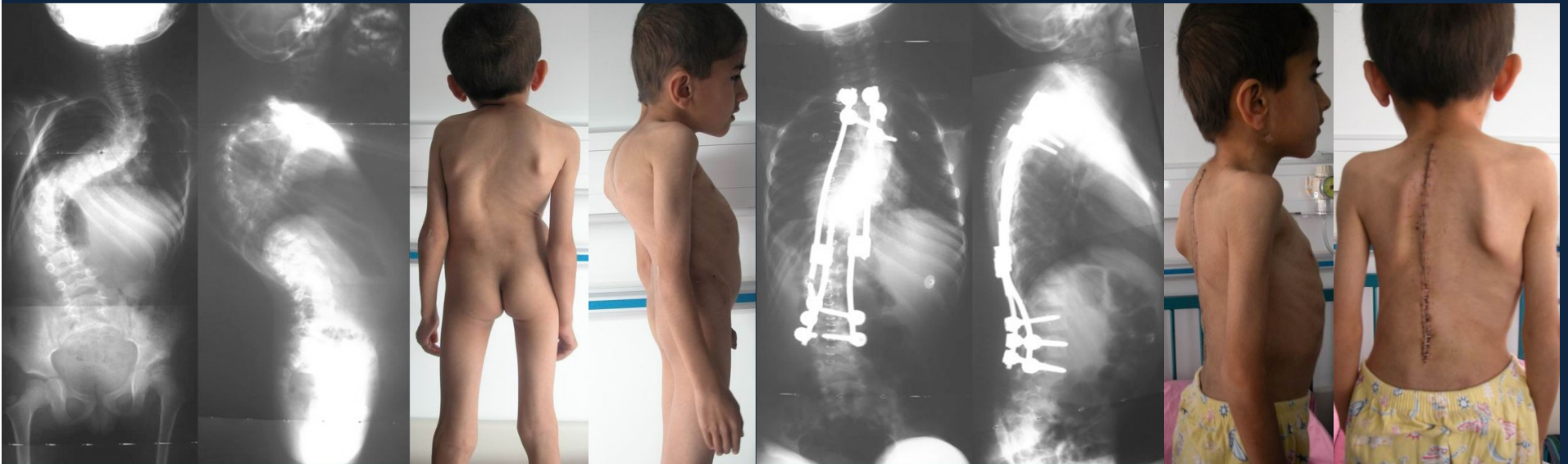
- Giving up the GR
  - Long posterior instrumented fusion with/out anterior diskectomy & fusion



# Kyphotic EOSD

---

- Modified GR
  - Strengthening the bone-implant interaction
    - Increasing the traditional two-level instrumentation to 3 or 4 in order to share load





# Kyphotic EOSD

---

- Modified GR
  - Strengthening the bone-implant interaction
    - Preferring supralaminar (especially on the most cranial level) and sublaminar hook placements instead of transverse process and pedicle hooks



# Kyphotic EOSD

---

- Modified GR
  - Strengthening the bone-implant interaction
    - Improving foundation strength with sublaminar wires or band fixation in addition to hook or pedicle fixation at the same levels (Johnston modification)



# Kyphotic EOSD

---

- Modified GR
  - Reducing deformity-increasing forces
    - Performing 3-4 levels of annulotomy and ALL release at the apex before index surgery



# Kyphotic EOSD

---

- Modified GR
  - Reducing deformity increasing forces
    - Following the patient in a halo-vest during the period to the first lengthening following index surgery, and after that, long-term continuation of external support

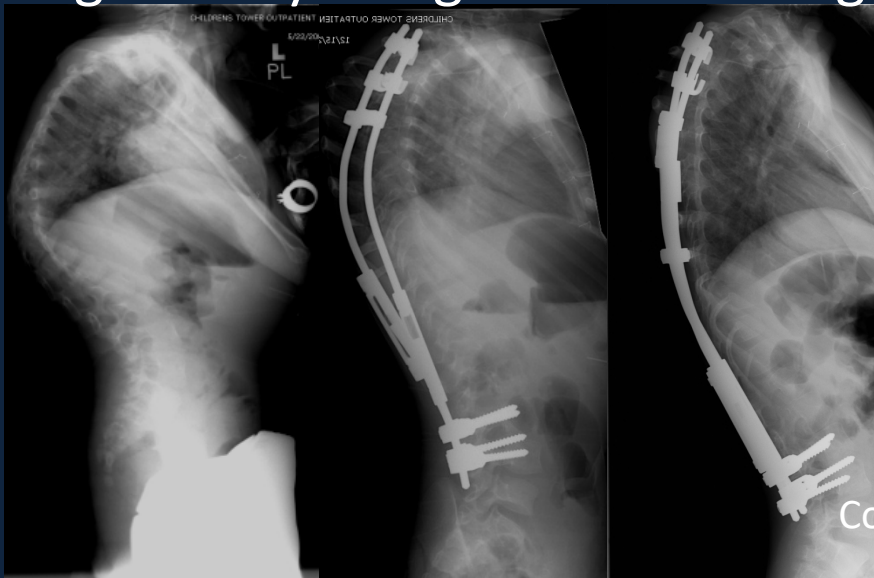




# Kyphotic EOSD

---

- Modified GR
  - Reducing deformity-increasing forces
    - Applying rods parallel to the deformity at index surgery with no attempt to perform correction in sagittal plane. With every lengthening, kyphosis is decreased gradually using in-situ bending (Skaggs modification)



Courtesy David Skaggs, MD

# Conclusion

---

- With one of these modifications applied alone or in combination with others, the growing rod technique can be used on scoliotic patients with kyphosis
- The presence of kyphosis alone is not a contraindication to GR
- However, it should be known that the possibility of implant-related complications is higher and this should be accepted by both the surgeon and the family.