RESTORATION OF THORACIC KYPHOSIS IN AIS PATIENTS WITH THORACIC HYPOKYPOSIS OR LORDOSCOLIOSIS USING MULTIPLE PONTE OSTEOTOMIES WITH OR WITHOUT ADDITIONAL BILATERAL RIB OSTEOTOMIES

Sinan KAHRAMAN, MD

Alim Can BAYMURAT, MD

Selhan KARADERELER, MD

Cem SEVER, MD

Feride Gokce INAN, MD

Isik KARALOK, MD

Ayhan Mutlu, MD

Tunay SANLI, MA

Meric ENERCAN, MD

Azmi HAMZAOGLU, MD

Istanbul Spine Center

Florence NIghtIngale Hospital

Istanbul-TURKEY

EUROSPINE 2017 Dublin EURO SPINE 2017

11-13 OCTOBER, DUBLIN, IRELAND

ISTANBUL ISC SPINE CENTER

PURPOSE

To investigate the clinical, radiological outcomes and pulmonary functions at the end of minimum 2 years follow up in AIS patients with thoracic hypokyphosis (TH) or thoracic lordosis (TL) who underwent either only MULTIPLE PONTE osteotomies (MPO) or ADDITIONAL BILATERAL RIB OSTEOTOMIES (BRO) to multiple Ponte osteotomies

ISTANBUL ISC SPINE CENTER

MATERIALS & METHOD

- *Inclusion criteria :*
- *Underwent posterior AIS surgery*

+

- *Performed Mulltiple Ponte Osteotomy*

with or w/o Bilateral Rib Osteotomy

- *Min. 2 years f/up*

62 pts (11m, 51f)

- **Group A: 40 pts who underwent only Multiple Ponte Osteotomy.**
- **Group B: 22 pts who underwent Bilateral Rib Osteotomy (between T4-T10) in addition to Multipl Ponte Osteotomy**

ISTANBUL ISC SPINE CENTER

MATERIALS & METHOD

- Mean correction rates in the coronal plane, and the increases of the sagittal plane parameters (T2-T12), (T5-T12) were compared between two groups.
- Preop and follow/up FVC, FEV1, and FEV1/FVC values on Pulmonary function test (PFT) were compared between the two groups.
- The clinical improvements were compared by changes in the SRS-22 and ODI values.
- Statistical analyses were performed with repeated measures T test and two way Anova for mixed measures

ISTANBUL ISC SPINE CENTER

RESULTS

- Mean age was 15.5 (13-18) and follow/up was 57.5 months (24-126).

- Correction rates for MT and TL/L curves;

	MPO	BRO + MPO
MT	88%	84%
TL/L	78%	76%

- Mean increases in T2-T12, T5-T12 angles in the sagittal plane, between the preoperative values and follow/up values;

T2-T12	19,3°	24,2°
T5-T12	17,8°	21,2°

- In follow/up , SRS22r and ODI values were;

SRS22r	4,4	4,2
ODI	6	8

ISTANBUL ISC SPINE CENTER

RESULTS

MEAN (min – max)	GROUPA (n=40)		GROUPB (n=22)	
	PREOP	FOLLOW/UP	PREOP	FOLLOW/UP
MT (°)	59,5 (43 - 76)	7 (3 - 13)	53,4 (32 - 65)	9,8 (3 - 16)
TL/L (°)	41,2 (23 – 60)	9 (5 – 19)	38,4 (22 – 65)	11 (4 – 22)
T2-T12 Kyphosis Angle (°)	+10,7 (-6 - 19)	+30 (20 - 39)	+2,5 (-18 - 16)	+26,7 (16 - 32)
T5-T12 Kyphosis Angle (°)	+3,5 (-5 - 9)	+21,3 (11 - 29)	+0,4 (-20 - 11)	+21,6 (11 - 28)
SVA (mm)	+2,15 (-5,8 – 24,8)	-3,8 (-16,7 – 24,1)	+5,2 (-6,6 – 26,1)	-4,6 (-25,7 – 9,2)
Lumbar Lordosis (°)	47,2 (18 - 65)	54,2 (36 - 66)	42,2 (25 - 60)	50,1 (38 - 62)
FVC (act. - %pred)	2,4 - 72	2,8 - 76	2,8 - 74	3,0 - 77
FEV1 (act. - %pred)	2,4 - 77	2,8 - 82	2,6 - 80	3,2 - 84
FEV1/FVC (%pred)	89 (81-98) →	94 (89-100)	93 (82 – 99) →	98 (95 – 100)
SRS-22r	3,6 (3,2 – 4,2)	4,4 (4,2 – 4,6)	3,2 (2,4 – 4)	4,2 (3,8 – 4,6)
ODI	12 (8 – 24)	6 (0 – 12)	16 (12 – 26)	8 (0 – 14)

ISTANBUL ISC SPINE CENTER

RESULTS

- **Mean number of multiple Ponte osteotomies ;**
  - **In MPO group ; 3 levels (2-5) Ponte osteotomies were performed**
  - **In MPO + BRO group ; 4 levels (2-6) Ponte osteotomies were performed**
- **Mean number of bilateral rib osteotomies ;**
  - **In MPO + BRO group ; 5 levels (3-8) bilateral rib osteotomies were performed**

ISTANBUL ISC SPINE CENTER

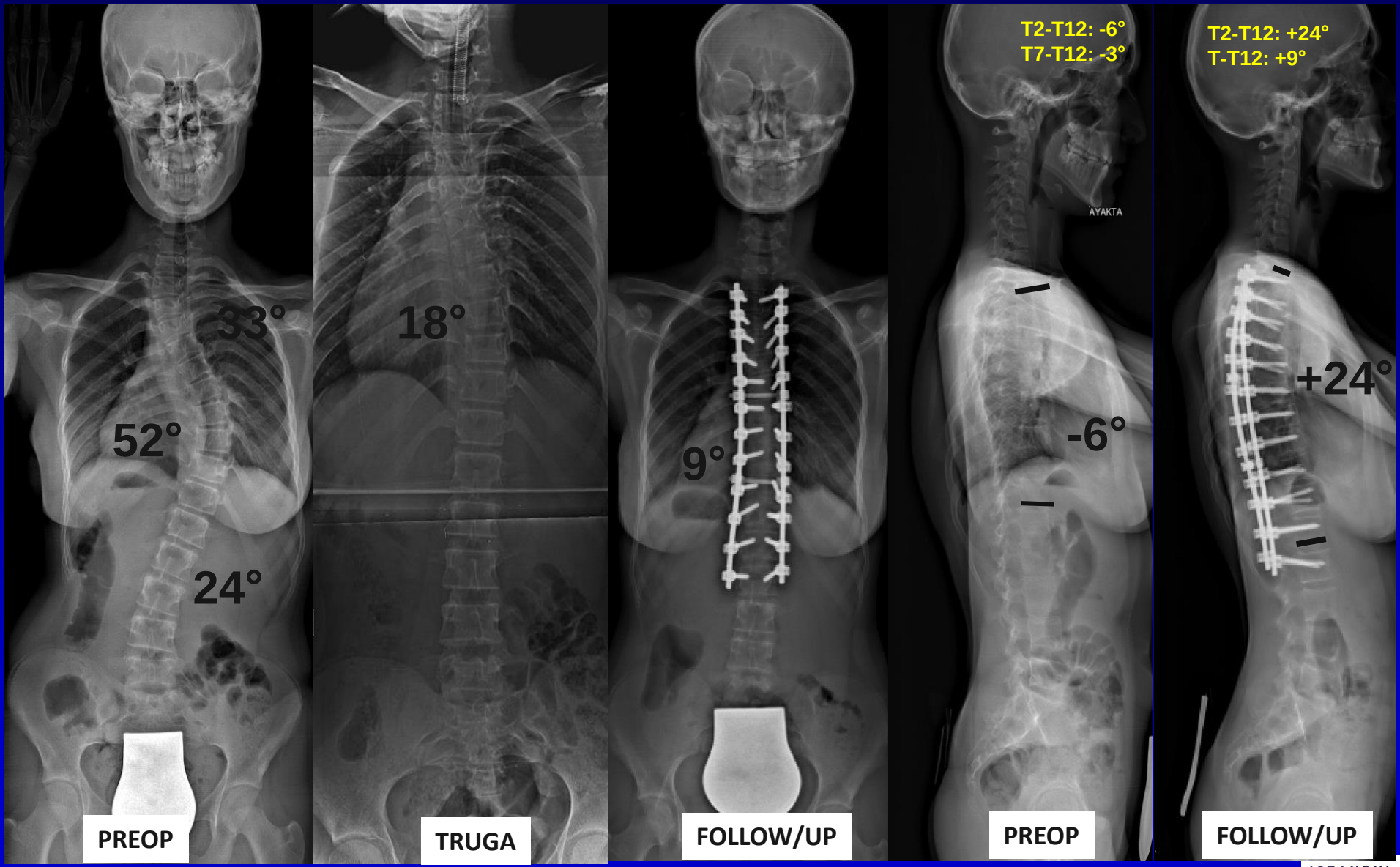
RESULTS

- Mean correction in patients who underwent MPO more than 3 levels was significantly higher than those with osteotomies less than 3 levels ($p<0.05$)
- Kyphosis restoration in the sagittal plane was better in MPO + BRO , however there was no statistically significant difference between the groups ($p>0.05$)
- Comparison of preop and follow/up Pulmonary function test (PFT) in both groups showed statistically significant improvement ($p<0,05$)

ISTANBUL ISC SPINE CENTER

EM, F, 15y

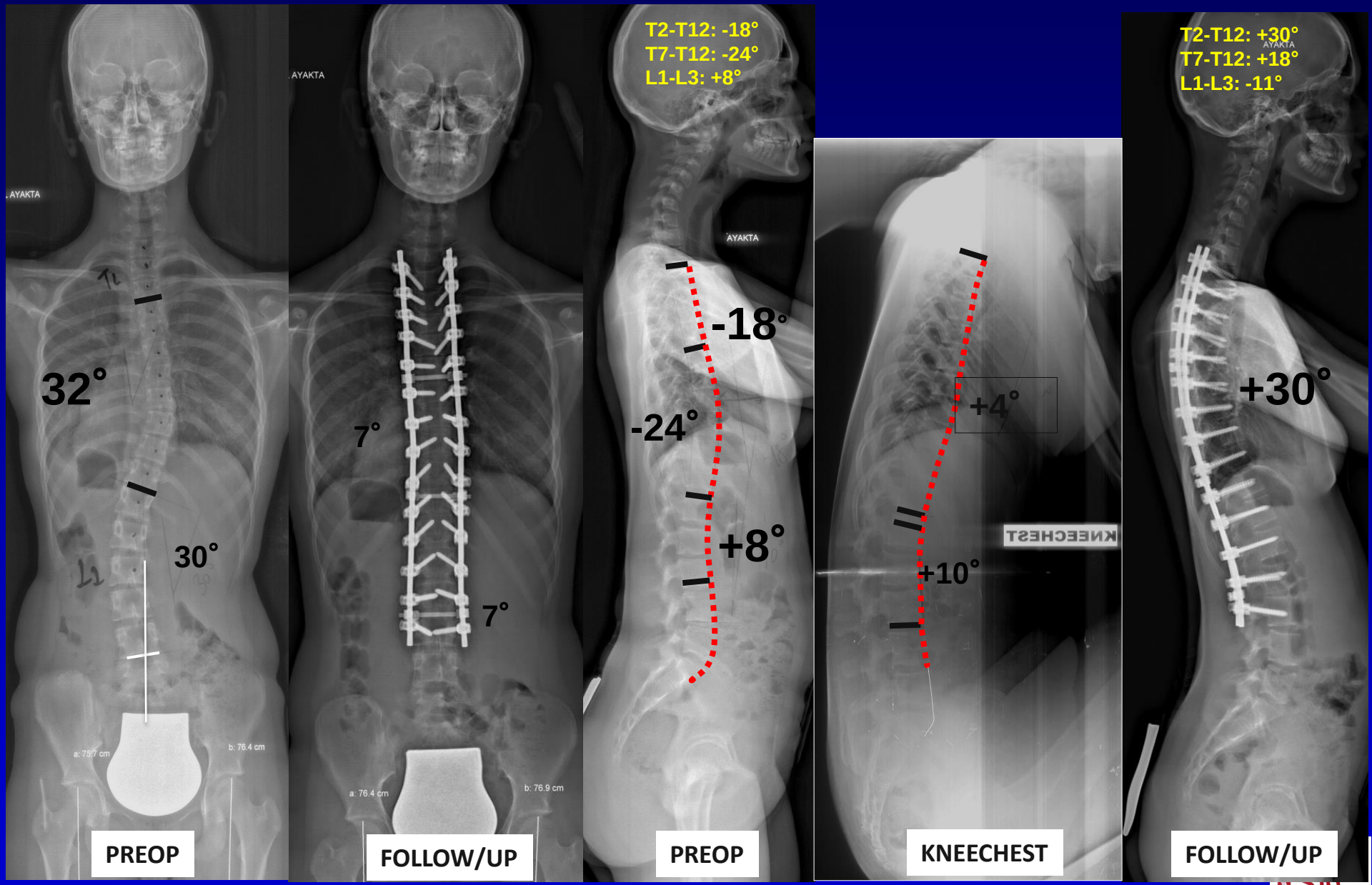
5 Level Ponte Osteotomies



ISTANBUL ISC SPINE CENTER

EM, F, 13y

5 Level Ponte Osteotomies + 7 Level Rib Osteotomies



CONCLUSION

- Better restoration of thoracic kyphosis was achieved when multiple Ponte osteotomies performed more than 3 levels.

- Additional bilateral rib osteotomies to multiple Ponte osteotomies provides better kyphosis restoration in AIS patients with thoracic hypokyphosis and thoracic lordosis when compared to only Multiple Ponte osteotomies

- Pulmonary function test showed similar improvement at the end of two years

ISTANBUL ISC SPINE CENTER

P81 - RESTORATION OF THORACIC KYPHOSIS IN AIS…

Author	Relationships Disclosed
Sinan KAHRAMAN	No Relationship
Alim Can BAYMURAT	No Relationship
Selhan KARADERELER	No Relationship
Cem SEVER	No Relationship
Feride Gokce INAN	No Relationship
Isik KARALOK	No Relationship
Ayhan MUTLU	No Relationship
Tunay SANLI	No Relationship
Meric ENERCAN	No Relationship
Azmi HAMZAOGLU	Medtronic (a, b)

(a) Grants/Research Support
(b) Consultant
(c) Stock/Shareholder
(d) Royalties
(e) Other Financial Support