



Complete conservative treatment with brace and scoliosis specific exercises can be effective for severe scoliotic curves exceeding 40° at peak of growth

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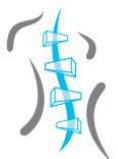
MSc Sports Physiotherapy





I have nothing to disclose





Aim of the study:

Effectiveness of Brace and PSSE

complete non-operative treatment
for severe Adolescent Idiopathic Scoliosis (AIS)

- **Ongoing Prospective study**
- **Inclusion criteria**
(>10 years, at least one curve with Cobb angle $> 40^\circ$,
Risser 0-2, < 1 year post-menarche, Cheneau 3D brace)
- **48 patients**
- (47 females - 1 male, mean age 12.4 years, Risser 0.6,
Cobb Th 55.3° ($41^\circ - 85^\circ$), Cobb Lu 52.6° ($40^\circ - 78^\circ$))
- **10 single & 38 double curves**
- Average follow-up 36.3 months
- Intention to treat analysis
- Paired t-test for statistical analysis

THE NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Effects of Bracing in Adolescents with Idiopathic Scoliosis

Stuart L. Weinstein, M.D., Lori A. Dolan, Ph.D., James G. Wright, M.D., M.P.H.,
and Matthew B. Dobbs, M.D.



Treatment protocol

Cheneau type brace

Full time rigid

+

**Physiotherapeutic Scoliosis Specific Exercises
(PSSE)**

5 times/week, 30 minutes, 1 supervised session/week

BSPTS-Rigo Concept and Schroth exercises



| | | | |
|---|-------------------------------|--|---------------------|
| Brace Compliance A (full-compliance) | 90%-100% of recommended hours | PSSE Compliance A (full-compliance) | 5 days/week or more |
| Brace Compliance B (partial compliance) | 70%-90% of recommended hours | PSSE Compliance B (partial compliance) | 3-4 days/week |
| Brace Compliance C (no compliance) | <70% of recommended hours | PSSE Compliance C (no compliance) | < 3 days/week |

Outcome parameters

- 1) **Curve progression (>5°)**
- 2) **In-brace correction**
- 3) **Compliance**
- 4) **SRS-22 questionnaire**
- 5) **TRACE Scale**
- 6) **Angle Trunk Rotation (ATR)**
by scoliometer
- 7) **Secondary analysis for**
 - **Full Compliant (brace + PSSE)**
 - **Single vs Double curves**



Results

Curve progression

| | | Curve | Progression | | |
|----------------------|--------------------------|------------------------------|--------------------------------|-------------------|---|
| Main analysis | 24 stable 50 % | 13 improved 27.1 % | 11 progressed 22.9 % | Total 48 patients | Success rate 77.1 % (37/48) |

| Pre-treatment | | Post-treatment | | Statistical significance |
|----------------------------|-----------------------------|----------------------------|--|--------------------------|
| Cobb angle Thoracic | 55.3° (41° – 85°) | Cobb angle Thoracic | 52.8° (33° – 82°) 95% CI -0.83 to 2.17 | p= 0.05* |
| Cobb angle Lumbar | 52.6° (40° – 78°) | Cobb angle Lumbar | 47.4° (31° – 78°) 95% CI 0.52 to 2.61 | p= 0.02* |



Results

Predictive factors (In-brace correction / compliance)

| | Mean Cobb angle pre-treatment | Mean Cobb angle in-brace | % in-brace correction |
|----------|-------------------------------|--------------------------|-----------------------|
| Thoracic | 55.3° | 37.4° | 32.3% |
| Lumbar | 52.6° | 38.2° | 27.4% |

| | Compliance PSSE A | Compliance PSSE B | Compliance PSSE C | Total |
|--------------------|-------------------|-------------------|-------------------|-------------------|
| Compliance brace A | 20 (41.7%) | 8 (16.7%) | 3 (6.2%) | 31 (64.6%) |
| Compliance brace B | 4 (8.3%) | 5 (10.5%) | 1 (2.1%) | 10 (20.8%) |
| Compliance brace C | 1 (2.1%) | 2 (4.1%) | 4 (8.3%) | 7 (14.6%) |
| Total | 25 (52.1%) | 15 (31.2%) | 8 (16.7%) | |

Results

A-A compliance group

| | Compliance PSSE A | Compliance PSSE B | Compliance PSSE C | Total |
|--------------------|-------------------|-------------------|-------------------|-------------------|
| Compliance brace A | 20 (41.7%) | 8 (16.7%) | 3 (6.2%) | 31 (64.6%) |
| Compliance brace B | 4 (8.3%) | 5 (10.5%) | 1 (2.1%) | 10 (20.8%) |
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| Total | 25 (52.1%) | 15 (31.2%) | 8 (16.7%) | |

A-A compliance group:

- Fully compliant with both brace and PSSE
- Positive effect of adherence to treatment protocol**

| | IBC Thoracic | IBC Lumbar | 24 stable | 13 improved | 11 progressed | Total 48 patients | Success rate |
|-----------------------------|--------------------------|--------------------------|-------------|---------------|---------------|-------------------|---|
| Whole group | 32.3% | 27.4% | 50 % | 27.1 % | 22.9 % | | 77.1% (37/48) |
| A-A compliance group | 34.2% (p=0.07) | 28.6% (p=0.09) | 55% | 35% | 10% | Total 20 patients | Success rate 90% (18/20) (p=0.02)* |

Results

Angle Trunk Rotation (ATR)

| Pre-treatment | | Post-treatment | | Statistical significance |
|---------------|----------------------------|----------------|----------------------------|--------------------------|
| ATR Thoracic | 12.8° (5° – 25°) | ATR Thoracic | 10.3° (4° – 23°) | p= 0.01* |
| ATR Lumbar | 11.6° (3° – 16°) | ATR Lumbar | 9.7° (3° – 15°) | p= 0.02* |

Results

Quality of Life - Aesthetics

| Pre-treatment | Score | Post-treatment | Score | Statistical significance |
|---------------|-------|----------------|-------|--------------------------|
| Pain | 21.6 | Pain | 22.4 | p= 0.05* |
| Mental health | 16.3 | Mental health | 18.5 | p= 0.006* |
| Self-image | 15.2 | Self-image | 19.3 | p= 0.0004* |
| Function | 20.4 | Function | 21.8 | p= 0.04* |
| Total SRS-22 | 73.5 | Total SRS-22 | 82 | p= 0.0002* |

| Pre-treatment | TRACE score | Post-treatment | TRACE score | Statistical significance |
|---------------|-------------|----------------|-------------|--------------------------|
| Pain | 8.4 | Pain | 6.2 | p= 0.008* |



Results

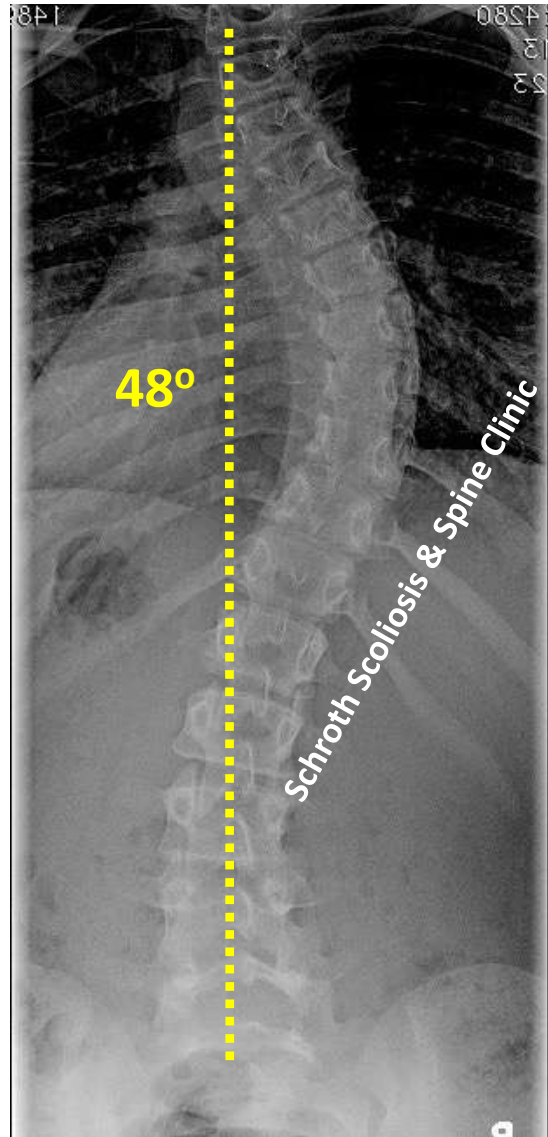
Single vs Double curves Thoracic vs Lumbar curves

| | Mean Cobb Th | Mean Cobb Lu | In-brace correction | Progression rate |
|---------------|--------------|--------------|----------------------|----------------------|
| Single curves | 47.3° | 48.6° | 50.3% | 0% |
| Double curves | 49.5° | 51.3° | 26.7% (p=0.0002)* | 28.9% (p=0.0001)* |

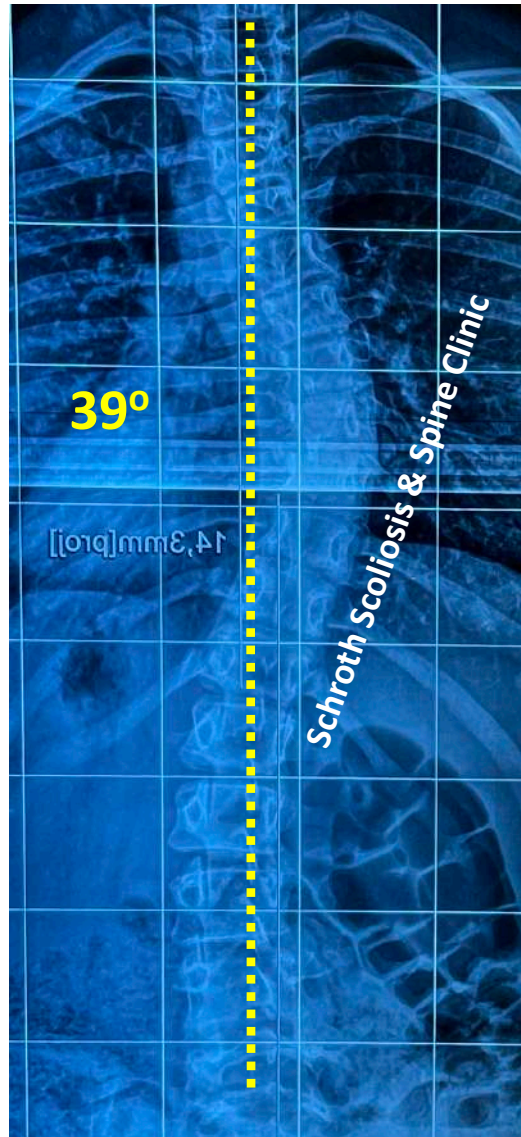
| | Single Thoracic curves | Double curves Thoracic part |
|---------------------|------------------------|-----------------------------|
| In-brace correction | 49.9% | 27.2% (p=0.0002)* |
| Progression rate | 0% | 32.8% (p=0.0001)* |

| | Single Lumbar curves | Double curves Lumbar part |
|---------------------|----------------------|---------------------------|
| In-brace correction | 50.9% | 25.5% (p=0.0003)* |
| Progression rate | 0% | 24.3% (p=0.0002)* |

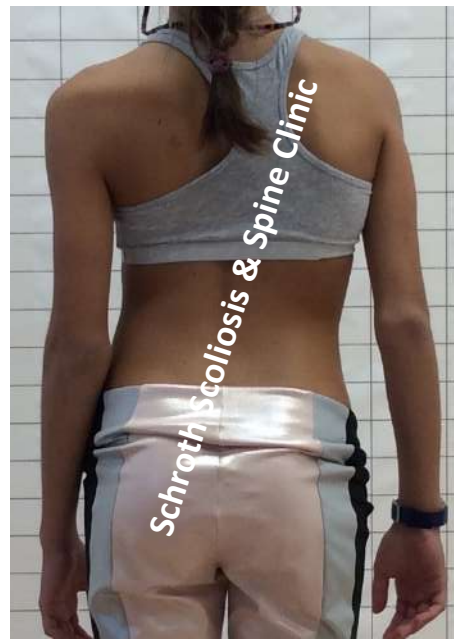




09-2020



09-2021
out of brace



09-2020



09-2020



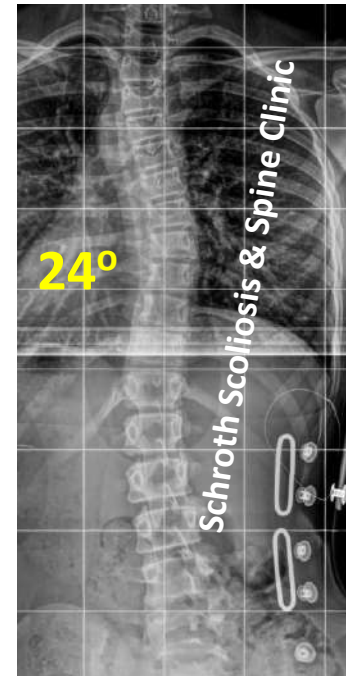
10-2020
in-brace



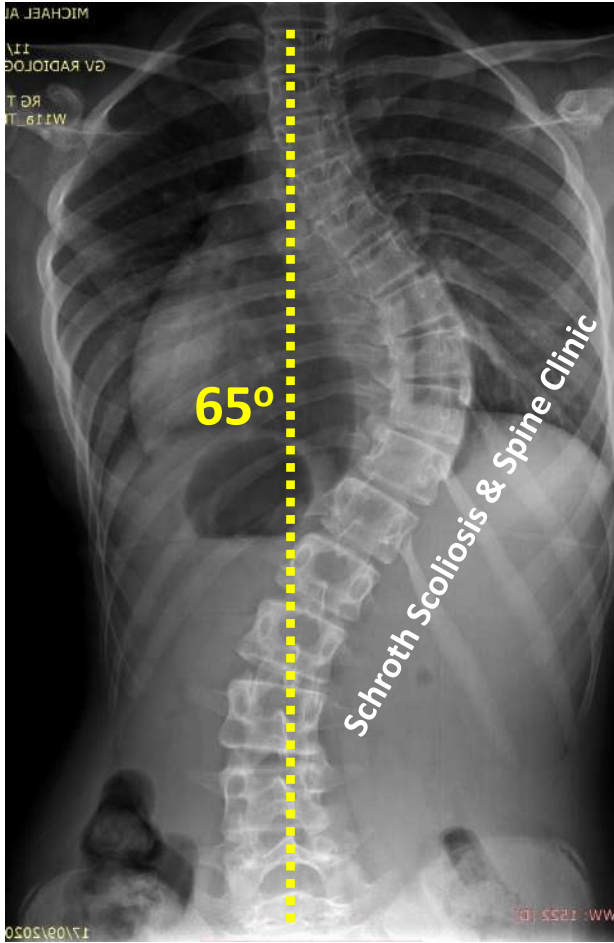
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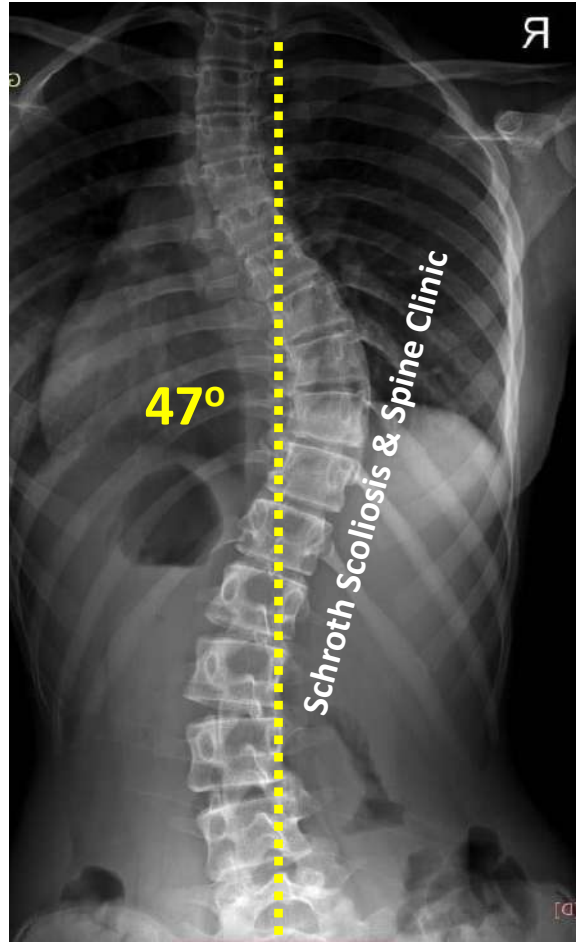
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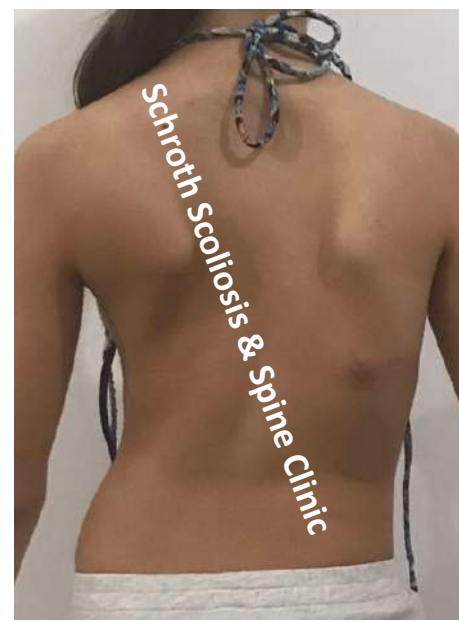
24°



09-2020



09-2021
out of brace



09-2020



09-2020



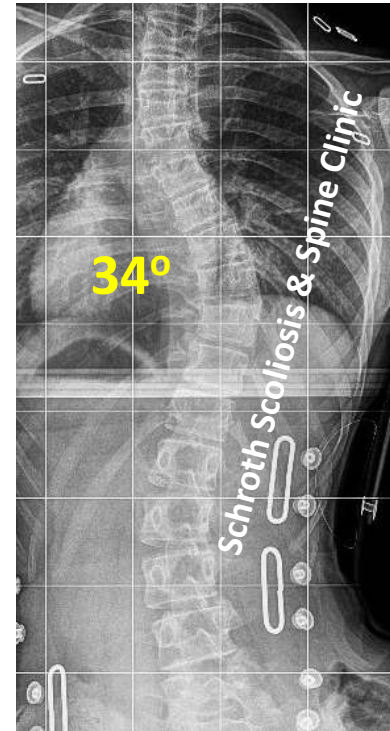
10-2020
in-brace



09-2021



09-2021



34°



Conclusions

Strengths

- Population with high risk of progression, Cobb angle $>40^\circ$, Risser 0-2

Limitations

- No brace sensors to measure compliance (Self-reported)
- No control group

- **A complete non-operative treatment with bracing and PSSE achieved a success rate of 77.1% (no progression $>5^\circ$)**
 - **Significant improvement of trunk rotation, body symmetry and QoL**
 - **In-brace correction was significantly higher in single than double curves**
 - **Single severe curves can have better prognosis than double severe curves**
- **Adherence to treatment protocol (brace wearing time and compliance with PSSE) is positive prognostic factor**





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Thank you for your attention

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