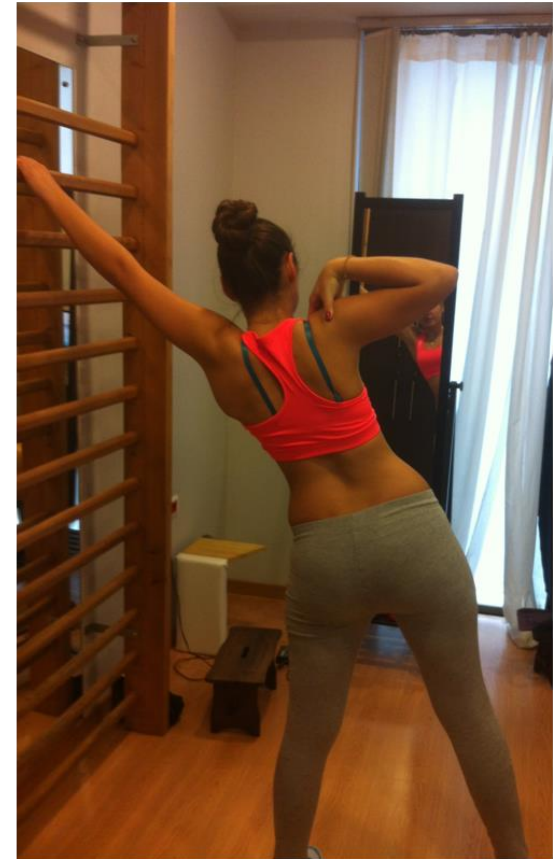


Corrective exercises in the treatment of Scoliosis

Nikos Karavidas, MSc, PT

Physiotherapeutic Scoliosis Specific Exercises (PSSE)

- Three-dimensional scoliosis treatment
- Curve pattern specific exercises
- Based on 3D auto-correction, training in ADL, stabilizing the correct posture and patient education
- The first step to treat idiopathic scoliosis to prevent progression
- The PSSE programs are designed only by Certified Physiotherapists
- Schroth method is the most established and evidence-based of the PSSE



Aims of PSSE

- Prevent progression of the curvature
- Reduce the deformity (sometimes even improvement of Cobb angle and ATR achieved)
- Improve Quality of Life
- Aesthetics improvement
- Pain reduction
- Improvement of Vital Capacity and chest expansion
- Training for ADL activities

Schroth Best Practice



Highly corrective exercises, looking for overcorrection dependent on the curvature type

Schroth Best Practice



Activities of Daily Living (ADL) training in standing and sitting positions according to curve pattern

Schroth Best Practice



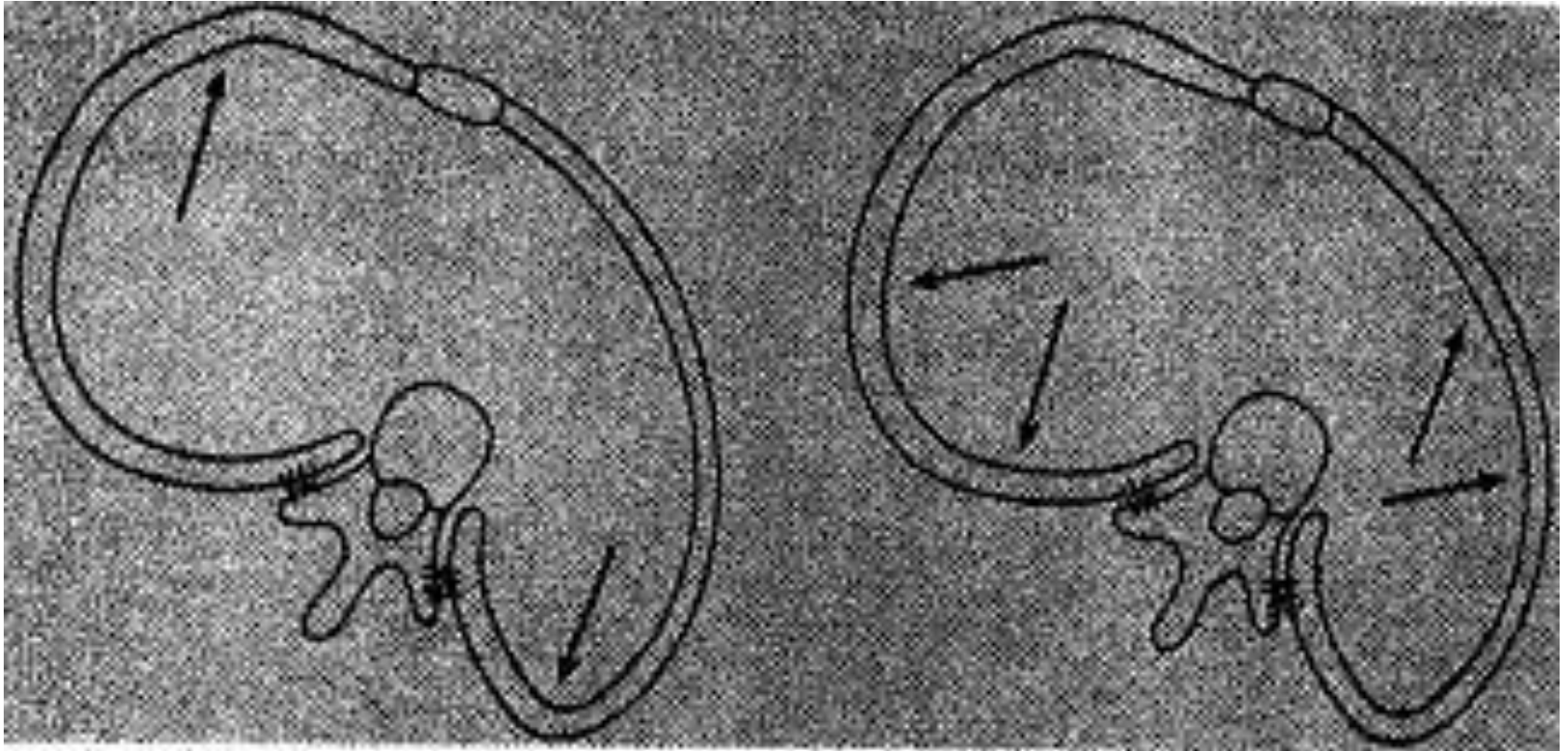
Truly 3-dimensional exercises, sagittal plane correction during Schroth exercises

Schroth Best Practice



Truly 3-dimensional exercises, sagittal plane correction during Schroth exercises

Schroth method



Rotational Angular Breathing (RAB) creates forces to derotate the vertebrae and the rib cage. Expand the collapsed areas during inhalation, stabilize the correction/expansion during exhalation

Schroth method



Schroth method for adult scoliosis. Main aims are pain reduction, aesthetics and quality of life improvement

PSSE indications

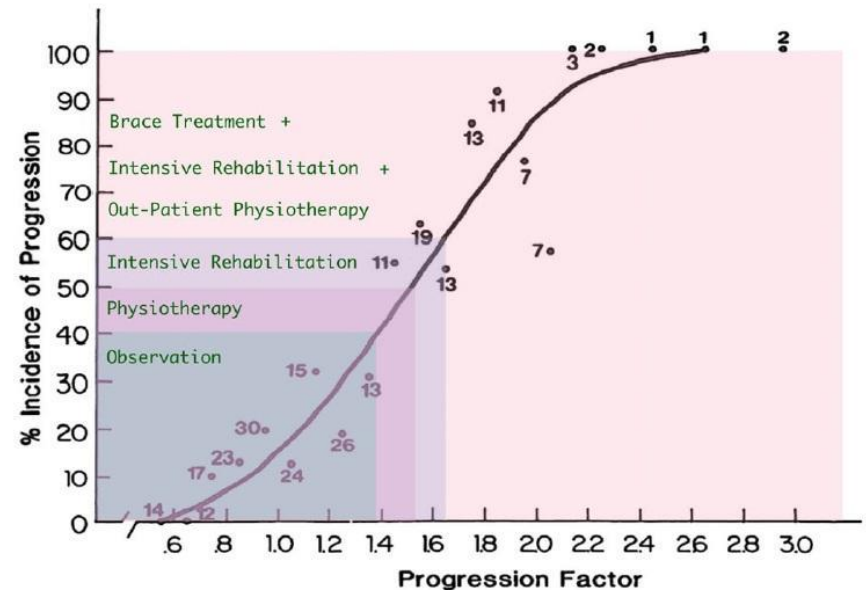
Sole treatment

- Adolescents with Cobb angle $< 20^\circ$, Risser 0-3
- Adolescents with Cobb angle 20° - 29° , Risk of progression 40-60% (Lonstein formula)
- Adolescents with Cobb angle $< 35^\circ$, Risser 4-5
- Adults with painful scoliosis
- People refused surgery

Combined treatment

- Brace indication (adolescents with Cobb angle $25^\circ - 40^\circ$, Risser 0-3)
- After spinal fusion

$$\frac{\text{Cobb Angle} - (3 \times \text{Risser sign})}{\text{Chronological age}}$$



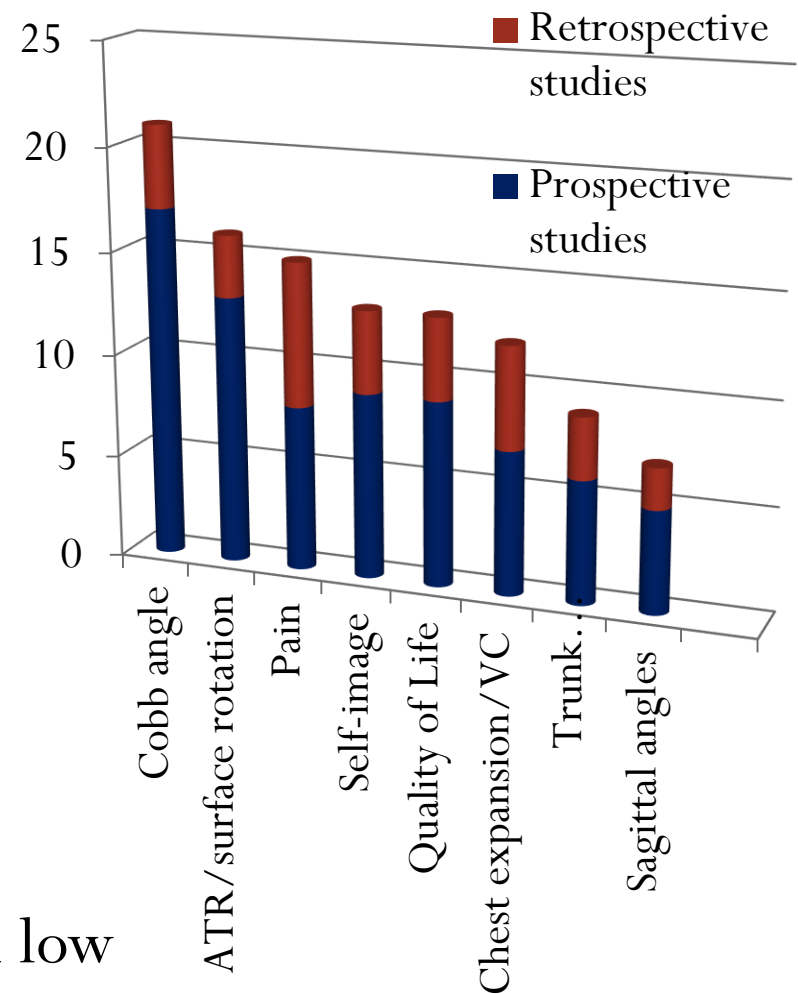
Literature review

- **1 Systematic Review with meta-analysis**
(Level of Evidence I)
- **4 Randomized Controlled Trials (RCT)**
(Level of Evidence I)
- **8 Systematic Reviews**
(Level of Evidence II)
- **10 Prospective studies**
(Level of Evidence II)
- **Many Retrospective studies and Case reports**
(Level of Evidence III and IV)



Scientific evidence

- All the studies presented some kind of effectiveness of the PSSE in scoliosis treatment
- The majority of the results showed improved of Cobb angle, ATR, pain, self-image, QoL, VC
- 3 Systematic Reviews (2012) found low quality of evidence for the use of PSSE in scoliosis treatment



Is there a body of evidence for the PSSE?

➤ **Cochrane Review** (Romano et al 2012)

Some evidence for PSSE, mostly based on a RCT (Wan et al 2005) with many limitations. Lack of good quality studies.

➤ **Systematic Review** (Weiss 2012)

No safe conclusions about PSSE, due to inadequate inclusion criteria in most studies

➤ **Systematic Review** (Mordecai and Dabke 2012)

Previous Systematic Reviews showed some effectiveness of PSSE, but based on poor methodological quality researches

RCT – Monticone et al 2014

- 110 subjects, 2 groups (1st PSSE, 2nd general exercise), identical baseline characteristics, 12 months follow-up
- Inclusion criteria: Cobb 10°-25°, Risser 0-1, Age > 10 years
- **Results**
 - Cobb angle: **PSSE** Improvement 69%, Progression 8%, Stable 23%
Control group Improvement 6%, Progression 39%, Stable 55%
 - ATR: **PSSE** Improvement by 3.5°, **Control group** stable
 - SRS-22 (QoL) : **PSSE** improvement > 0.75 all domains (pain, function, self-image, mental health), **Control group** no significant changes
- **Conclusions:** PSSE can reduce the risk of progression in mild scoliosis (<25°) and have significantly better results than general exercises

RCT – Kuru et al 2015

- 45 patients, 3 groups (1st supervised Schroth, 2nd home Schroth, 3rd observation), identical baseline characteristics, 6 months follow-up
- Inclusion criteria: 10-18 years, Cobb 10° – 60° (mean 30°), Risser 0-3
- **Results:**

Schroth supervised significant improvement in Cobb angle by 2.5° (p=0.005), ATR by 4.2° (p=0.001), hump height by 68.66 mm and waist asymmetry

Control group no improvement in any parameter

- **Conclusions:** Schroth method seems to be effective in scoliosis treatment, at least better than observation

RCT – Schreiber et al 2015

- Schroth method added to standard care (observation or brace)
- 50 patients, 2 groups (1st standard care + Schroth, 2nd standard care- control), identical baseline characteristics, 6 months period
- Inclusion criteria: 10-18 years, Cobb 10^o-45^o, Risser 0-2

- **Results:**

Schroth group Improvement of muscle endurance and ability to keep an upright posture by 27.5 sec more than control

Schroth group significant improvement of pain and self-image on SRS-22 questionnaire

- **Conclusions:** Adding Schroth method to standard care offers significantly better results than standard care alone

Systematic review with meta-analysis (Anwer et al 2015)

- The most recent SR, including the latest RCT's on PSSE
- Literature review: Pubmed, CINAHL, Embase, Scopus, Cochrane Register of Controlled Trials, PEDro, Web of Science
- Outcomes evaluated: Cobb angle, ATR, QoL
- 30 studies, 9 fulfilled the inclusion criteria, 6 had high methodological quality on PEDro scale, 3 RCT's
- Meta-analysis revealed moderate-quality evidence that PSSE can reduce Cobb angle and ATR and improve QoL in scoliotic patients
- **Conclusions:** Now there is scientific evidence that PSSE are effective in scoliosis treatment and superior than general exercises

SRS statement on PSSE (May 2014)



- A combination of brace and PSSE seems to provide better results in scoliosis treatment
- There is scientific evidence that PSSE are superior than general or no exercises
- SRS actively supports studies with PSSE for scoliosis treatment
- SRS and SOSORT consensus research guidelines

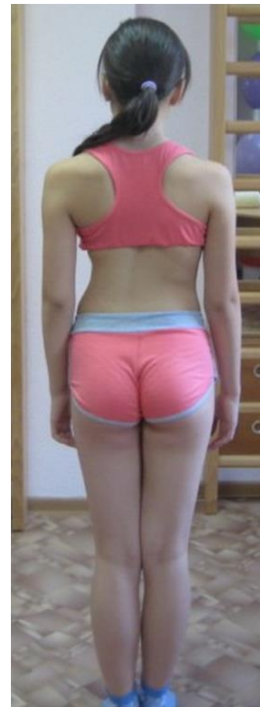
SOSORT guidelines for scoliosis treatment (2011)

- PSSE is the first step to treat scoliosis and prevent progression or bracing
- Brace treatment must always be accompanied by PSSE
- A multi-professional therapeutic team, consisted of MD, CPO and PT, is recommended to achieve the best treatment result
- PSSE programs are designed only by Certified Physiotherapists



Conclusions

- There is clear scientific evidence for the effectiveness of PSSE in scoliosis treatment
- PSSE can be served as a sole treatment for mild scoliosis in adolescents and for adult scoliosis, while the combination with bracing during growth spurt seems to provide better results
- Both Scientific Societies, SRS and SOSORT, support the role of PSSE in scoliosis treatment and their superiority from general exercises
- Future studies must use SRS inclusion criteria and robust methodological quality to ensure repeatability and generalization of the results



Thank you for your attention

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