The aim of the study was to undertake the process of cultural adaptation and reliability analysis of the Spinal Appearance Questionnaire (SAQ) into Polish. The SAQ is an instrument for measuring quality of life of scoliotic adolescents who are being treated conservatively with wearing of a corrective brace [1]. The SAQ consists of 34 Likert-scale items associated with eight domains. The Spanish version of the SAQ was validated in 170 Spanish adolescents [2].

The Polish version was performed. The process of cultural adaptation of the questionnaire was compliant with the guidelines of the International Quality of Life Assessment (IQOLA) Project. It involved 30 adolescents, ages ranging between 10.0 and 17.0 years, all with Adolescent Idiopathic Scoliosis (AIS) and all wearing the same kind of brace (Chêneau). The SAQ was translated in to Polish by two independent translators. During the second stage of the translation, the Polish version was compared to the original version and an expert committee commented on the result. The reliability and validity testing was undertaken using the cross-sectional study. The statistical analysis calculated the reliability (internal consistency), floor and ceiling effects of the SAQ [3, 4]. The Polish version of the SAQ was found to be valid and reliable for Polish adolescents with AIS. This conclusion is supported by high values of internal consistency (Cronbach’s alpha = 0.83) and good test-retest reliability (ICC = 0.82).

References:
Conclusion: Polish version of BrQ is reliable and can be used in Polish adolescents with idiopathic scoliosis wearing the brace to assess their quality of life.

References

The Trunk Appearance Perception Scale (TAPS) discrepancy between scoliosis children and their parents influence the SRS-22 score

M Rigo, E D’Agata, M Jelacic
Institut Elena Salvà, Barcelona, Spain
Scoliosis 2012, 7(Suppl 1):O3

Background: The Trunk Appearance Perception Scale (TAPS) is a valid instrument to assess self-perception of trunk deformity [1]. The SRS-22 has been widely used to measure Health Related Quality of Life in scoliosis population but it is not clear which factors can influence its final score [2-4].

Materials and methods: Community-based study including 71 (62 F, 9 M) patients with idiopathic scoliosis (treated and not treated), attending the orthopedic clinics between March 2008 and November 2010 were included in this study and fulfilled the questionnaire. They were using Cheneau brace for 11.65±11.37 months (range 2–30) 7 were male and 31 were female. Mean Cobb angle was 34.45± 10.89 (range 18-57) and mean rotation angle was 6.13° ± 4.19 (range 0-22). The average stress value was 11.57 ± 5.25 (range 22-3). There was a negative correlation between brace using time and stress (r= -0.870, p=0.03); and there was no correlation between age and stress (r=0.208, p=0.64).

Conclusion: Previous studies suggested that the BSS questionnaire is reliable for deformity related stress. We used the BSSQ and our study showed that braces in AIS treatment seem to produce stress.

References

O5 Importance of team to increase compliance in adolescent spinal deformsity brace treatment: a cross-sectional study of two different settings

F Tessadri1, A Pellegrini1, M Tavernaro1, A Zonta1, S Negrini2
1Orthotecnica, Trento, Italy; 2ISICO, Milan, Italy
Scoliosis 2012, 7(Suppl 1):O5

Background: SOSORT Brace Treatment Management Guidelines highlight team’s role [1,2].

Purpose: To verify the importance of rehabilitation team in adolescent patients bracing.

Materials and methods: Population: 38 patients (28% hyperkyphosis, 72% AIS) extracted from one single CPQ database; same MD; brace wearing for at least 6 months between 01/01/2008 and 01/09/2009; age 10 or more.

Methods: Two questionnaires: the SRS-22 [3,4], and one especially developed (QTI) with 25 multiple choice questions about adherence to treatment (sections: brace, exercises, team).
Groups: the differences between the two PT teams were team building (G1 highly structured and collaborative) and setting (G1 private, G2 health national service). G1 included 13 patients and G2 25.

Results: No population differences at baseline. Response rates: 92% QT et al. Eura Medicophys Effectiveness of complete – Barcelona Scoliosis Physical Therapy School 35(24)

Twenty-one subjects took part to the study, – ‘The prevalence of eating –’

AF5. Autoconcepto forma 5. Only 3 (1.6%; IC95 -0.2/3.4%) ent girls with idiopathic scoliosis Scoliosis 2012, Volume 7 Suppl 1

‘Checking how, after years low degree scoliosis impairs –’

‘Abnormal arrangement of the body may lead to the –’

‘through a mixed ANCOVA, we found statistical differences –’

‘treatment, the Italian group improved in SRS-Pain while the E.Salvá group –’

‘better radiographic results (6.7° improvement vs 4.2°).’

‘throughout the study.”

Conclusions: With the same MD and CPO (i.e. same brace and treatment type and quality), PT team building and setting plays a major role in compliance and final results.

References


O6

Health related quality of life in adolescents with idiopathic scoliosis: a cross-cultural comparison between two methods of treatment E D’agata,*, C Pérez-Testor, M Rigo, S Negriini, V Cigoli* 1 Universitat Ramon lull, Barcelona, Spain; 2Institut Elena Salvá, Barcelona, Spain; 3ISICO, Milan, Italy; 4Università Cattolica di Milano, Milan, Italy 

Scoliosis 2012, 7(Suppl 1):O6

Purpose: The present study aims at evaluating the effects produced on HRQOL by two different methods of physiotherapy in adolescent population with Idiopathic Scoliosis (IS): SEAS, used in Milan (Italy) in ISICO center, and Barcelona Scoliosis Physical Therapy School, in E. Salvá Institut (Spain).

Background: Studies related to HRQOL are generally few [1], controversial and besides there is a lack of research related to physiotherapy and HRQOL [2].

Materials and methods: Twenty-one subjects took part to the study, ages ranging between 9 and 18 years. Thirteen of them were Italian (5 boys and 6 girls) and the 9 Spanish (2 boys and 7 girls). For all of them it was the first time to be visited. The materials used were: Rosenberg’s self-esteem test [3,4], Self Concept test [5], Body Satisfaction Scale [6] and SRS-22 questionnaire [7,8]. Tests were given three times: on the first visit, three and six months later.

Results: Through a mixed ANCOVA, we found statistical differences between pre-test and post-test. In relation to the interaction effect, Time X Treatment, the Italian group improved in SRS-Pain while the E.Salvá group presented worse results at the end. However, the treatment had a significative effect on SRS-Self Image (p=0.016) and on Emotional Self Concept, as the E.Salvá group scored higher.

Conclusions: Further researches will aim at increasing the sample size, in order to enrich the results, and at looking for more homogeneous groups and centers (Country, setting, size, etc).

References


O7

Scoliosis in adolescents reduces the risk of eating disorders F Zaina*, S Donzelli*, M Lusini*, M Togomorig*, V Negro*, S Negriini1

1ISICO Milan, Italy; 2Università Cattolica del Sacro Cuore di Milano, Italy

Scoliosis 2012, 7(Suppl 1):O7

Background and purpose: A recent study suggests a correlation between idiopathic scoliosis in adolescence and eating disorders [1]. Nevertheless, this did not correspond to our clinical experience in this same population. The aim of this study was to verify the correlation between scoliosis and eating disorders in adolescence.

Materials and methods: Design: cross-sectional study.

Population: 187 consecutive adolescent girls with idiopathic scoliosis (mean Cobb angle 26°, range 11-73°, age 15.2±2.5, 24% juveniles, 76% adolescent type); 93 school-girl controls (age 14.9±1.0).

All the subjects answered the Italian validated questionnaire EAT-26 about eating habitude in order to retrieve eating disorders. BMI was calculated for all subjects and compared to reference data.

Statistical Analysis: chi-square test and ANOVA.

Results: Only 3 (1.6%); IC95 -0.2/3.4%) subject in the scoliosis group showed EAT-26 scores suggestive for eating disorders versus 7 (7.5%); IC95% 2.2/12.9%) in the school population; the difference was statistically significant (p<0.05). The odds ratio of eating disorders in adolescents with scoliosis is 0.2 (IC95 –1.18/1.58). BMI was slightly lower (p<0.05) for scoliosis patients (19±0.2) that for school girls (21±0.3).

Conclusions: EAT-26 is recognised among the most valid questionnaires for eating disorders and has been widely applied in various countries. Applying it, we found a lower incidence of eating disorders in female scoliosis patients than in the general population (both our own controls and Italian reference values). This contrast with some expert opinions and a recent study performed in Italy. The low BMI already reported in the literature as typical of scoliosis subjects is confirmed by our data.

Reference


O8

Some long-term effects of scoliosis diagnosed at school age O Nowotny-Czupryna, A Kowalczyk, K Czupryna, J Nowotny1, M Plaszewski2

1Medical University of Silesia in Katowice Katowice, Poland; 2Institute of Physiotherapy – Higher School of Administration in Bielsko-Biala, Poland 

Scoliosis 2012, 7(Suppl 1):O8

Background: Abnormal arrangement of the body may lead to the development of overload syndrome, nerve roots irritation, pain, ventilator impairment and also worsening of physical fitness [1-3].

Objective: Checking how, after years low degree scoliosis impairs breathing, reduces performance and generates back pain was the aim of the study.
Materials and methods: Respiratory function, working capacity (PWC170) and pain intensity (Jackson and Moskowitz regimen) were assessed in 39 adults, aged from 19 to 38 years, who were diagnosed in adolescence with low degree scoliosis (10°-28°). Also, 43 controls with no scoliosis in adolescence were examined.

Results: There was no progression of the curvature after the treatment. Spirometric results among scoliotic subjects were slightly lower than in the controls, although it did not show the characteristics of the restrictive type of respiratory disorder, which was found in 5.1% of patients. PWC170 test results were significantly lower (by about 20%) than in controls, and 84.6% subjects reported periodic, occasional of frequent, mostly lumbar pain associated with the work performed. In 12.8% cases pain impeded breathing. In about half of the group pain occurred especially after physical effort and caused limitation of activity, while in other subjects did not affect daily activities.

Conclusions: 1) subjects with low degree scoliosis generally do not indicate impairment of lung ventilation with the characteristics of restrictive disorders, with settled low degree scoliosis characterized by lack of physical fitness, in the form of reductions in PWC170; 3) the presence of school-age low degree scoliosis predisposes to the occurrence of pain symptoms in adulthood.

References

O9
A pilot, case-control study on quality of life and function in adults with mild-to-moderate scoliosis treated in adolescence with physical exercises
M Plaszewski1, R Nowobiski2, T Kotwicki1, P Kowalski3, W Chwala4, M Cieśliński1, R Batycki1, I Cieslinski1
1University School of Physical Education, Warsaw, Poland; 2Faculty of Physical Education in Biala Podlaska; 3, University of Medical Sciences, Poznan, Poland; 4Higher School of Administration, Bielsko-Biala, Poland; 5University School of Physical Education, Cracow, Poland; 6District Hospital, Bialsk – Biala, Poland
Scoliosis 2012, 7(Suppl 1):O9

Background: Studies on adults treated in adolescence surgically or with braces for idiopathic scoliosis, and on untreated subjects, indicate that both the condition and interventions can lead to psychological stress, poorer body image and self-esteem and can reduce quality of life [1-4]. Comparable evidence regarding treatment with specific physical exercises is lacking.

Purpose of the study: We aimed to discuss the design of our ongoing case-control study on adults treated in adolescence for scoliosis with specific exercises in the Centre of Corrective and Compensatory Gymnastics in Bielsko–Biala, Poland, and to indicate tendencies shown in a pilot analysis.

Materials and methods: Medical records of 3099 subjects who attended the Centre between 1984 and 1995 and 2158 age-matched individuals, are accessible. A pilot case-control study on 12 treated subjects and 10 controls, aged 31.4 (27 – 37) years, Cobb 35.4 (10 - 54°), was conducted. Total lung capacity and spirometry, physical activity, back pain, self-functioning, quality of life and patients’ attitudes towards treatment were measured. One-way ANOVA for a non-parametric U-test were performed.

Results: Individual results differed, but their relation to curve angle was observed. Differences between treated and untreated individuals were ambiguous. However, inter-group analyses showed nonsignificant differences between all variables (p<0.05).

Conclusions: Preliminary results differ from findings of the studies on brace patients: the Ste-Justine Adolescent Idiopathic Scoliosis Cohort Study, studies of Danielsson and Nacenson, and continuing observations of Weinstein and coauthors. However, low power of the pilot study does not allow concluding.

Acknowledgements: This paper is a part of a research project DS.136, University School of Physical Education, Warsaw, Poland.

References
idiopathic scoliosis (AIS) were bothered by ACH based on our original questionnaires conducted in patients undergoing surgery. **Materials and methods:** Fifty-seven AIS patients (all females) who underwent surgical treatment were included in this study. A mean age at the time of surgery was 17.2±4.6 years. A mean preoperative Cobb angle of the main thoracic curve was 58±14°. The questionnaire consisted of five numerically-rated questions asking how much the patient was bothered by thoracic hump, lumbar hump, ACH, waist asymmetry, and shoulder imbalance. The perception about the deformities was scored from 0 (None) to 10 (Worst). Correlation between the score of ACH and thoracic Cobb angle was also evaluated.

**Results:** The mean score of ACH was 3.8±3.4 points, which was almost equal to that of lumbar hump (3.9±3.7 points). The mean scores were 5.8±3.9 points in waist asymmetry, 5.7±3.5 points in thoracic hump, and 4.9±3.4 points in shoulder imbalance. The score of ACH was significantly correlated with thoracic Cobb angle (correlation coefficient: 0.43, p<0.001).

**Conclusions:** The results indicated that ACH was bothering problem for AIS patients similarly to other trunk deformities. Since the perception of trunk deformity reported to be strongly associated with patient satisfaction for treatments [1], ACH should be noted as one of the trunk deformities bothering patients.

**Reference**

**O12**

The effect of patient positioning during radiographs on the resulting Cobb angle measurements

M Siljander1, P Knott, S Thompson2, S Wardjek2
1Rosalind Franklin University North Chicago, USA; 2Illinois Bone and Joint Institute Morton Grove, USA

**Scoliosis 2012, 7(Supp 1):O12**

**Background:** Standing spinal radiographs have been the primary method of spinal deformity evaluation in patients with scoliosis. During periods of patient surveillance, the clinician compares radiographs over a period of time to assess the progression of the deformity [1-3]. One of the potential problems in comparing one radiograph to another is difference in positioning [4-6]. The goal of this study is to quantify the effect of trunk rotation on Cobb angle measurements, and provide an algorithm to describe this relationship.

**Material and methods:** CT scans of three patients with Adolescent Idiopathic Scoliosis were used retrospectively. Three-dimensional reconstructions of the images were created by CT scan software. Cobb angles were drawn for scoliosis curves in the anterior plane. The 3-D image was then rotated two degrees to the right, and Cobb angle measurements were repeated. This procedure was repeated through 14 degrees of right rotation, and then subsequently through 14 degrees of left rotation.

**Results:** The effect of trunk rotation on Cobb angle measurements is directly related to the location of the scoliosis curves, the magnitude of those curves, and the magnitude of lumbar lordosis and thoracic kyphosis. In general however, a two degree rotation of the patient’s trunk while positioning results in a one degree change in the measured Cobb angle (in patients with larger scoliosis curves, and in the first six degrees of trunk rotation).

**Conclusions:** Patient positioning can have a significant effect on the calculation of scoliosis measurements, and this needs to be considered when evaluating the progression of spinal deformity.

**References**
Conclusions: Clinicians and researchers should consider seeking a second review of the DSA (especially if it appears to be in the DSA 2 to 3 range), and the Cobb angle, prior to using it to make prognostic predictions and treatment decisions.

References

O15 Sagittal and pelvic parameters analysis in patients with adolescent idiopathic scoliosis
S Donzelli1, F Zaina, S Negrini
ISICO, Milan, Italy
Scoliosis 2012, 7(Suppl 1):O15

Background and purpose: The sagittal alignment of the spine and pelvis in adolescent idiopathic scoliosis is poorly defined in the literature [1-8]. The purpose of this study was to assess the sagittal alignment in scoliosis patients according to curve degree and type.

Material and methods: Sagittal parameters of the spine and pelvis were analysed in lateral standing radiographs of 256 adolescents (13.7±5 years, curve range 4-57) and compared with statistically normal values (NV) in adolescents found in the literature: thoracic kyphosis TK (NV 22-66), lumbar lordosis LL (NV 24-72), pelvic incidence PI (NV 27-71), sacral slope SS (NV 25-57) and pelvic tilt PT (NV -8-16). Lateral standing radiographs were matched with anteroposterior radiograph. Patients were classified according to the entity of scoliosis curves, age, gender and risser score.

Results: There is a weak negative correlation (0.2) between scoliosis and kyphosis. Over 20° Cobb PI increased, mainly due to an increase of the SS. In our population we had low PI and SS, but mainly in less than 20° curves than in higher scoliosis; on the contrary, PT was high in all children.

Analysing curves type and decrease of SS we found that this occurs more frequently in patients with double curves (thoracic and thoracolumbar).

Conclusions: PI increases through life, and curves degree worsen with growth, and this influence our results. Patients with spinal deformities have a positive sagittal balance and signs of pelvic retroversion such as decreased SS. According to our data this situation occurs to patients with thoracic and thoracolumbar curves.

References

O16 Complete validation of plumbine distances as a screening tool for sagittal plane deformities
S Negrini1, S Donzelli1, F Zaina, K Heitman2, G Frattocchi2, M Mangone3
1ISICO (Italian Scientific Spine Institutes) Milan, Italy; 2Diers International, GMBH, Germany; 3Cattedra Medicina Fisica e Riabilitativa, Universita La Sapienza, Roma, Italy
Scoliosis 2012, 7(Suppl 1):O16

Background: While for scoliosis screening Scoliometer has been widely validated, there is no validated screening instrument for sagittal plane deformities.

Purpose: To validate a screening tool for sagittal plane deformities (plumbine distances - PD).

Material and methods: Surface measurements (Formetric) of kyphosis/lordosis were considered the Gold Standard [1]. Correlations between Human PD (HPD), Formetric PD (FPD) and Gold Standard were searched in 129 school screening pupils (age 11.8±0.7): not correlated PD were eliminated. ROC-curve statistical technique was used to determine the best cut-off for remaining PDs.

Final FPD were verified in 7257 Formetric evaluations from the Diers database (3 age groups: 6-9y12m, 10-17y12m, 18-78). Final HPD were verified in 103 scoliosis/hyperkyphosis patients aged 14.3±2.2.

Results: HPDs correlate with FPDs (0.49-0.57). C7+L3 with kyphosis (0.54-0.58), L3 with kyphosis and lordosis (0.42-0.56). To identify 60° kyphosis, a cut-off of 90 mm for C7+L3 demonstrated an overall accuracy range of 75-93%, high specificity (78-95%), variable sensitivity (25-83%). HPDs very well ruled out normals (negative predictive value –PV 93-99%), even if with high numbers of false positives (positive predictive value +PV 8-25%). Similarly, for 55° lordosis, a cut-off of 45 mm for L3 demonstrated a 75-94% overall accuracy, 70-94% specificity and 25-100% sensitivity, with –PV 93-100% and +PV 9-20%.

Conclusions: In all groups evaluated results were similar. Below 90mm C7+L3 (45mm L3) almost all pupils are below 60° kyphosis (55° lordosis); in the remaining 20% a not-ionizing surface evaluation (Formetric) should be proposed to identify real deformities (1 out of 4 to 10).

Reference

O17 Is the surface topography a helpful tool for the management of scoliosis?
D Papadopoulos
SPONDYLOS Laser Spine Lab, Athens, Greece
Scoliosis 2012, 7(Suppl 1):O17

Background: The aim is to reveal the importance of surface topography in complement to the x-rays [1,3].

Material and methods: We have used the Formetric 4D-Dicom II system, which is supplied also with lateral Cobb angle measurement. We have examined 616 patients (432 females and 184 males), age 5 y to 21 y. The patients have been visited clinically by inspection, Adams forward bending test and Perdriolle scoliometer. We have fit, to every patient, 4-8 reflectors on the apex of T1 through L4 spinal process and 2 shoulder reflectors to get the possibility for lateral Cobb angle measurement with the Formetric 4D.

Results: We have varied data through surface topography. Torsion, rotation, shoulder tilt, etc, but we have insisted on the Cobb angle measurement. We had a >95% accuracy in Scoliosis between 22° and 65° Cobb angle. The accuracy was lower, between 95% to 70%, if the measured curve was > 65° and very poor, less than 50%, when the curve was < than 20° in x-rays. As it concerns the Kyphosis, the Cobb angle was very accurate as it was exceeded 90%.
Conclusions: We believe that the surface topography is a precious tool for the diagnosis and follow up of a complex three dimensional skeletal deformity, such as scoliosis. The accuracy of the Cobb angle measurement is excellent and we believe that we must move to the next step, which is the 3D dimension.

References

O18
The influence of body mass index (BMI) on the reproducibility of surface topography measurements
P Knott 1,2, S Mardjetko 1, S Thompson 2
1 Rosalind Franklin University North Chicago, USA; 2 Illinois Bone and Joint Institute, USA; 3 Northwestern University, USA
Scoliosis 2012, 7(Suppl 1):O18

Background: Surface Topography can be used to evaluate patients with spinal deformity, especially adolescents with scoliosis in whom a reduced number of radiographic evaluations is desired. The Formetric 4D (Diers International GmbH, Schlangenbad, Germany) is a surface topography system that is able to identify anatomical landmarks and construct a 3-dimensional model of the spine using only surface features. One would guess that a leaner patient with easily identifiable bony landmarks would be an ideal patient for this system, and that a patient with a higher Body Mass Index (BMI) would be more difficult to measure [1-5].

Materials and methods: In this study, fourteen female patients were measured 30 times each to evaluate the reproducibility of the Formetric measurements. The patients ranged in BMI from 16.9 to 29.0, and the reproducibility of each of the Formetric parameters was correlated to BMI.

Results: Results showed that there was not a strong correlation between any of the individual surface topography parameters and the BMI. The reproducibility of the calculated scoliosis curve did correlate with BMI, however, (r = 0.65) and this correlation was significant (p = 0.012), showing that the higher the patient’s BMI, the more variability was present in scoliosis angle calculations.

Conclusions: Overall, the reproducibility of the Formetric 4D was very good even in patients with higher BMI. The patient with the highest BMI (29) still had Formetric measurements that were +/- only 4.6 degrees for scoliosis curve calculations.

References

O19
A comparison of automatic vs. manual detection of anatomical landmarks during surface topography evaluation using the formetric 4D system
P Knott 1,2, S Mardjetko 1, S Thompson 2
1 Rosalind Franklin University North Chicago, USA; 2 Illinois Bone and Joint Institute, USA
Scoliosis 2012, 7(Suppl 1):O19

Background: The Formetric 4D System (Diers International GmbH, Schlangenbad Germany) is a popular system for measuring surface topography in patients with adolescent scoliosis [1-4]. The system automatically detects anatomical landmarks on the patient, but then gives the user the opportunity to make adjustments to those landmarks if necessary. The purpose of this study was to see whether there would be more variability in repeated measurements if the landmarks were adjusted by the clinician or if they were left in the place where the machine had put them.

Materials and methods: Twelve patients who had adolescent scoliosis of less than 30 degrees were measured for this study. Thirty repeated measurements of each patient were performed using the Formetric 4D, and the machine was allowed to select all the anatomic landmarks without assistance from the clinician. Each output parameter was analyzed to see the amount of variability that existed in the data. Each scan was then opened in the Formetric software, and the anatomic landmarks were adjusted by the clinician to move them to the exact location that coordinated with the visible surface topography. The data was then re-evaluated to see whether the amount of variability had increased or decreased.

Results: Twelve parameters were compared, including the scoliosis angle. There were no statistically significant changes in any of the parameters before and after the landmarks were changed by the clinician.

Conclusions: The conclusion is that it was not necessary for the clinician to make adjustments to the anatomic landmarks because the outcomes are not significantly changed by these manual adjustments.

References

O20
Can scoliosis follow up by surface topography (Biomod-L®) securely predict Cobb angle progression? Longitudinal study; preliminary results on 60 patients
M De Seze 1, G De Korvin 2
1 University Hospital Bordeaux Cedex, France; 2 Priv Pmr Pratiquesaint Gregoire, France
Scoliosis 2012, 7(Suppl 1):O20

Background: The gold standard parameter for scoliosis follow-up is the Cobb angle from full spine radiographs. However, the repetition of X-rays on children and adolescents may increase future cancer risks [1,2]. Our project is to space out X-rays assessments by using a Moiré based Surface Topography device (Biomod-L®). Two reference postures have been selected after a preliminary study: 1) Jointed elbows and coiled shoulders (dorsal hump measurement); 2) Erected position, hands grasping wall bars (all other measurements).

Purpose: Can the progression of Biomod-L® parameters securely predict the progression of Cobb angles measured on X-rays?

Materials and methods: 60 patients (mean age 13.4 years old; 9-18) who had undergone at least two simultaneous X-Rays + Biomod-L® assessments were included in a row. This provided a total of 75 “follow up segments” distributed on different periods of growth, preliminary follow up and treatment follow up.

The X-rays criteria were +3° for progression and -5° for improvement. The Biomod-L® progression was assessed on the hump, lordosis, spinal curves and list measurements, and on a subjective comparison of the fringe mapping.

Results: For worsening prediction: sensitivity 90%, negative predictive value 90%, specificity 60%, positive predictive value 59%. For improving prediction: sensitivity 50%, negative predictive value 87%, specificity 91%, positive predictive value 62%.

Conclusion: According to the sensitivity and negative predictive value for worsening prediction, Biomod-L® seems a reasonably reliable tool for detecting slight progressions of the Cobb angle and to be used as a trigger for X-Rays controls.
References

O21
Electrocardiographic abnormalities in children with idiopathic scoliosis
J Durmala 1*, M Sosnowska, M Sosnowski 2
1 School of Health Care Katowice, Poland; 2 School of Medicine, Medical University of Silesia, Katowice, Poland
Scoliosis 2012; 7(Suppl 1):O21

Background: Cardiac involvement in the natural history of Idiopathic Scoliosis (IS) is not uncommon. We aimed at assessment of ECG abnormalities in a relatively large population of children with IS.

Materials and methods: 303 children, hospitalized in our Department, were examined. There were 260 girls and 43 boys, aged 14.2±0.2 and 14.1±0.4 years. Children with a certain diagnosis of cardiovascular disease were excluded. All patients had clinical and radiological evaluation. A routine ECG was recorded during in-hospital stay and analyzed for the presence of abnormal values/patterns in respect to age, gender and scoliosis gravity.

Results: Any ECG abnormalities were found in 166 children (55%). In most of them 1 abnormal value/feature was seen (118, 39%), in 42 at least 2 (14%), and in 6 children >2 ECG pathologies were found (2%). The rsr pattern was most frequent (128, 42%). RVH was seen in 7 children (2%), LHV in 12 (4%) and LAE in 4 (1%). In 11 children (4%) abnormal HR was found, prolonged PR in 12 (4%), prolonged QRS in 23 (8%) and prolonged QTC in 1 (0.3%). P-wave axis deviation (11, 4%), QRS axis deviation (7, 2%), T-wave axis deviation (2, 1%) and abnormal ventricular gradient (9, 3%) were also noticed. Presence of the ECG abnormalities did not depend on age, gender and the number or gravity of curvatures.

Conclusions: There are number of abnormal ECG parameters in children with IS. Most of them are benign or negligible. More serious ECG abnormalities is uncommon, however, their presence should be more deeply evaluated.

References

O22
Nutritional status in idiopathic scoliosis
J Durmala 1*, M Sosnowska, M Sosnowski 2
1 School of Health Care Katowice, Poland; 2 School of Medicine, Medical University of Silesia, Katowice, Poland
Scoliosis 2012; 7(Suppl 1):O22

Background: A relatively high proportion of lean body habitus is an acknowledged feature of idiopathic scoliosis [1]. We aimed at evaluation of nutritional status in schoolchildren with idiopathic scoliosis managed in a single center of rehabilitation. Data from a homogeneous population regarding current national BMI reference is presented.

Materials and methods: 303 children were included. There were 260 girls and 43 boys, aged 14.2±0.2 and 14.1±0.4 years, resp. In each girl or boy, the body height and mass was measured by using the standardized protocol. Individual BMI (kg/m2) was classified according to the established normal and gender-related range (Z-score) of limit for Polish children. The calculations were performed on basis of actually measured height (BMI), as well as after height correction (BMICor). Data were compared with the BMI distribution in healthy children.

Results: The BMI values lower than 2SD Z-score and 1SD Z-score were found in 3.9% and 17.8%. The BMI values higher than 2SD and 1SD were found in 0.3% and 7.9%, resp. After correction for height, the proportions for low BMICor were 5.0% and 24.0%. There was none case of obesity after height-correction, and the proportion of overweight children reached 6.0%. Compared to BMI in normal population, the frequency of low BMI or BMICor in IS was found 3.05- or 4.2-times higher, resp. On contrary, the frequency of high BMI or BMICor was 2.0 or 2.7-times lower, resp.

Conclusions: Almost one-third of children with IS are underweight, while obesity is a sporadic feature. Reasons of low nutritional status should be explained in each case.

Reference

O23
To BrAIST or not to BrAIST: decisions and characteristics of 1131 patients eligible for the Bracing in Adolescent Idiopathic Scoliosis Trial
L Dolan, S Weinstein, BrAIST Study Team
University of Iowa, Department of Orthopaedic Surgery, Iowa City, USA
Scoliosis 2012; 7(Suppl 1):O23

Background: BrAIST is a partially-randomized trial comparing the outcomes of bracing and observation in children with adolescent idiopathic scoliosis. The purpose of this study is to evaluate 1) whether the BrAIST sample is representative of the target population and 2) whether the treatment arms are equivalent. We addressed these questions by comparing baseline demographic, radiographic and psychosocial characteristics between the groups.

Materials and methods: Since April 2007, 1131 patients met eligibility criteria; 360 (32%) agreed to participate. There were no statistically significant differences between those who declined and those who agreed to participate in terms of largest Cobb angle, curve type, gender, or age. Blacks/African-Americans were more likely to participate (50%) than other racial groups (p<0.01).

Results: Of the 360, 219 (61%) entered into the bracing arm. Before treatment, there were no statistically significant differences in demographics, curve characteristics (Cobb angle, curve type, rotation, kyphosis, lordosis), skeletal maturity, general health, back pain and psychosocial characteristics including body image and quality of life. However, those who were very dissatisfied with their current back condition were more likely to choose a brace (73 vs. 51%, p<0.01).

Conclusions: BrAIST is still open to enrollment and these results are preliminary. At this point, the sample appears representative of the target population of high-risk adolescents, indicating BrAIST results can be generalized outside this sample. Without complete randomization, the equivalence of the two treatment arms is therefore not guaranteed, but the fact that we found no significant differences in this analysis provides some confidence for minimal selection bias in the final results.

O24
A prospective randomized study of the natural history of idiopathic scoliosis versus treatment with the SpineCor brace
C Coillard, A Circo, C Rivard
Sainte-Justine Hospital, Montreal, Canada
Scoliosis 2012; 7(Suppl 1):O24

Background: The purpose of this randomized study was to evaluate the effectiveness of the Dynamic SpineCor brace [1,2] for early adolescent idiopathic scoliosis (15°-30°) compared to the natural evolution of the disease. 47 patients participated in this study (26 treated and 21 controls).

Material and methods: The inclusion criteria where: 1) High risk of evolution: family history and/or proven progressive; 2) Significant pathological malformation of the spine; 3) Girl or boy; 4) Initial Cobb angle between 15° and 30°; 5) Risser 0, 1 or 2. Assessment of brace effectiveness included: 1) percentage of patients who have 5° or less curve progression and the percentage of patients who have 6° or more progression at skeletal maturity; 2) percentage of patients who have had surgery recommendation/ undergone before skeletal maturity.
Results: At three years follow up a correction was achieved in 50% of treated patient and only in 9.5% of controls, stabilization in 23.1% treated and 33.4% in controls and progression in 26.9 % for the treated group and 59.1% for controls. Three immature patients required surgical fusion while receiving treatment (11.5%) as well as 3 control patients (14.3%). For the control patients we considered as a failure if the Cobb angle worsened by more then 5° from the original angle and the patient then received treatment.

Conclusions: The SpineCor brace is effective for the treatment of early adolescent idiopathic scoliosis comparing with its natural history. Moreover, the positive outcome appears to be maintained in the long term.

References

O25 Effectiveness of the SpineCor treatment for large scoliotic curves compared to moderate and small curves
C Coillard, A Circo, C Rivard
Sainte Justine Hospital, Montreal, Canada
Scoliosis 2012, 7(Suppl 1):O25

Background: The purpose of this retrospective cohort study was to evaluate the effectiveness of the Dynamic SpineCor brace for large adolescent idiopathic scoliosis (40°-50°) compared to moderate (30°-40°) and small curves (15°-30°) [1,2].

Materials and methods: 657 consecutive scoliotic patients that accepted the treatment and had a definite outcome were included in this study. We divided the patients in four groups depending on the initial Cobb angle: 15-29° (n=378), 30-39° (n=207) and 40-50° (n=72).

Assessment of brace effectiveness included: 1) percentage of patients who have 5° or less curve progression and the percentage of patients who have 6° or more progression at skeletal maturity, 2) percentage of patients who have had surgery recommendation before skeletal maturity.

Results: Success of the treatment (stabilisation or correction) was achieved in 80.8% of patients with small curves compared to 62.9% for moderate and 46% for large curves. Progression of curves was observed in 14% of small curves compared with 28.9% for moderate and 48.5% for large curves. Two years follow-up post treatment 24.2% (for small), 17% (for moderate) and respectively 16% (for large) of patients that finished the treatment still corrected their Cobb angle without wearing the brace.

Conclusions: The SpineCor brace is effective for the treatment of large adolescent idiopathic scoliosis comparing with moderate curves. Moreover, the positive outcome appears to be maintained in the long term.

References

O26 Treatment of lumbar curves in adolescent females affected by idiopathic scoliosis with a progressive action short brace (PASB): assessment of results according to the SRS committee on Bracing and Nonoperative Management Standardisation Criteria
AG Aulisa, T Gazzanti, C Persiano, F Falciglia, G Maggi, L Aulisa
1 Children Hospital Bambino Gesù, Rome, Italy; 2 G Maggi, L Aulisa: SOSORT award 2010 winner.
Scoliosis 2012, 7(Suppl 1):O26

Background: The effectiveness of conservative treatment of scoliosis is controversial. Some studies suggest that brace is effective in stopping curve progression, whilst others did not report such an effect. The purpose of the present study was to effectiveness of PASB in the correction of lumbar curves, in agreement with the SRS Committee on Bracing and Nonoperative Management Standardisation Criteria [1][2].

Materials and methods: Fortyteen adolescent females (mean age 12.95 ± 1.72 years) with lumbar curve and a pretreatment Risser score ranging from 0 to 2 have been enrolled. The minimum duration of follow-up was 24 months (mean: 41.75 ± 34.47 months). Antero-posterior radiographs were used to estimate the curve magnitude (CM) and the torsion of the apical vertebra (TA) at 5 time points: beginning of treatment (t1), one year after the beginning of treatment (t2), intermediate time between t1 and t4 (t3), end of wearing (t4), 2-year minimum follow-up from t4 (t5). Three situations were distinguished: curve correction, curve stabilisation and curve progression.

Results: CM mean value was 26.43 ± 2.77 SD at t1 and 13.80 ± 7.94 SD at t5. TA was 10.83 ± 3.74 SD at t1 and 7.88 ± 4.24 at t5. The variation between measures of Cobb and Perdriolle degrees at t1,2,3,4,5 and between CM t5-t1 and TA t5-t1 were significantly different.

Curve correction was accomplished in 82.5% of patients, whereas a curve stabilisation was obtained in 17.5% of patients.

Conclusions: The PASB, due to its peculiar biomechanical action on vertebral modelling, is highly effective in correcting lumbar curves.

References


O28 Lessons to be learned: best and worst results from a 7 years old clinical database of scoliosis patients
S Negrini1, S Donzelli, F Zaina
ISICO, Milan, Italy
Scoliosis 2012, 7(Suppl 1):O28

Background and purpose: To verify which patients can reach the best and worst results during conservative treatment, since it is not yet known from previous researches [1,2].

Material and methods: All scoliosis patients with more than 2 visits included in a prospective clinical database started in September 2003 were reviewed on August 31st 2010. A cut-off of 20 degrees (improvement or worsening) from the first observation was used to select patients. Patients were analysed for diagnosis, morphology, Cobb angle at start, curve improved/worsened, treatment, gender, Body Mass Index, clinical parameters.

Results: Out of 1886 consecutive patients (TP), 62 (3.3%) changed 20° or more: 26 (1.4%) improved (range 20-34°) (IP), 36 (1.9%) progressed (20-60°) (PP).

Females prevailed in IP and low BMI in PP. In PP prevailed juveniles (35% vs 15%-23.8% in IP-TP); conversely, secondary scoliosis prevailed in both IP and IP (25%-15% respectively vs 19% in TP). In IP there were only patients who started over 30° Cobb (100%), while in PP 47% started between 10 and 19°; corresponding percentages in TP were 33.9% and 28.5% respectively. Diagnosis of thoracolumbar single curve was the most common in IP (46% vs 22.1% in TP), while double in PP (67% vs 49.8% in TP). Curves improved were thoracolumbar (IP: 50%), worsened thoracic (PP: 78%). Only patients who had a good or optimum treatment improved, but this was true also in 56% of progressed.

Conclusions: Since these results are not similar to what would be expected according to the known natural history, conservative treatment appears able to change it.

References

O29 It is possible to make patients use braces the hours prescribed: first results from the thermobrace clinical everyday usage
S Donzelli1, F Zaina, S Negrini
ISICO, Milan, Italy
Scoliosis 2012, 7(Suppl 1):O29

Background and purpose: Compliance to bracing has been questioned, and temperature sensors advocated to check it. Since 2010 we started the everyday clinical use of a temperature sensor (Thermobrace): aim of this study is to present the results of the first patients.

Materials and methods: Population: 68 scoliosis consecutive patients (79% females, age 14.2±2.4) who accepted to use Thermobrace and had finished at least one period of treatment on the 31st December 2010. Actual hours worn per day were measured; compliance (percentage of prescription) and reported compliance (percentage of hours reported by the patient) were calculated. For reliability purposes, we use two different data processing methods.

Results: Brace prescription was 16 to 23 hours per day. Average Thermobrace use was 5.2±2.25 months. Referred compliance was 94.3% (range 50-113%), the real one 86.1% (range 55-108%) or 89.9% (range 57-111%) according to the two different measurement methods. More than half of the patients had at least a 90% compliance with both readings. No wearing days were 1.0% of total and involved only 29% of patients.

Conclusions: Compliance is neither due to type of treatment, nor to the patient alone. SOSORT criteria for bracing clearly state the importance of the treating team in this respect. This is the first study using a temperature sensor in a setting respecting SOSORT criteria, and shows compliance to brace much higher than what was previously reported. In the everyday clinics, Thermobrace offers a valuable insight to increase compliance even further, and make treatment rely on real data.

References

O30 Biomechanical aspects of idiopathic scoliosis evolution
AG Aulisa1,2, V Guzzanti1, C Persiàno1, MC Lavagna2, G Scuderi2, L Aulisa2
1Children’s Hospital Bambino Gesù, Rome, Italy; 2*A. Gemelli* Hospital, Università Cattolica del Sacro Cuore, Italy
Scoliosis 2012, 7(Suppl 1):O30

Background: In patients with idiopathic scoliosis, the interaction between biological and mechanical factors plays a central role in the evolution of deformities. According to the “vicious cycle model” of scoliosis evolution, the asymmetric load on the spine is the main factor driving the onset and development of deformities by altering the vertebral growth dynamics. Hence, once a critical asymmetric load has established, the progression of deformity is unavoidable, unless a compensatory force is applied to offset the biomechanical effects of growth [1,2]. Here, we present a case series of adolescents with idiopathic scoliosis, in whom a normal vertebral morphology was achieved before the end of growth, who withdrew from the orthotic treatment during the growing age and maintained the correction over a 5-year follow-up.

Materials and methods: Forty-six adolescents (40 girls and 6 boys) with idiopathic scoliosis treated with PASB or Lyon or Milwaukee brace, who achieved a complete curve and vertebral symmetry correction and withdrew from the treatment before the skeletal growth was complete. Participants presented with lumbar (n = 17), thoracolumbar (n = 26) or dorsal (n = 3) curve. The mean age at the beginning of treatment of 12.13 ± 2.16 years. All participants were prescribed with full-time bracing for an average of 5.33 ± 19.94 months. An early weaning was suggested, provided that a full-time bracing would be reinserted if correction was lost. However, such a condition was not observed.

Results: X-rays taken at the beginning of treatment showed a curve value of 23.93 ± 4.14° Cobb and Perdriolle value inferior to 15° Perdriolle. Radiologic examinations performed during the course of treatment evidenced a progressive reduction of vertebral rotation and lateral curvature, until the complete recovery of spinal geometry. At the end of treatment, all patients experienced a complete lateral curve correction. X-rays taken during the following 2 years showed a curve stabilization, with an average curve value of 4.80 ± 0.75° Cobb. Only 29 cases experienced a mild curve progression (7.62 ± 4.35° Cobb).

Conclusion: The biomechanical component is the major force involved in curve evolution. The restoration of a normal vertebral geometry via conservative treatment stops the scoliosis evolution and results in a permanent correction of the curve.

References

O31
Study of the corrective forces applied by a dynamic derotation brace (DDB)
L Loukas1, C Nicolopoulos2, Z Zachariou3
1Medical School, National & Capodistrian University of Athens Anoixi, Greece; 2ORTH-FOOT Center, Athens, Greece; 3*KAT Hospital of Athens, Greece
Scoliosis 2012, 7(Suppl 1):O31

Background and purpose: The direct forces exerted by the brace pad were analyzed on 1700 idiopathic scoliotic patients (36 girls, 6 boys) treated with a DDB [1]. Twenty-seven patients had a single right thoracic curve and 17 had a single left or right thoracolumbar curve. The aim was the analysis of the corrective forces, exerted at the skin-brace interface, by altering the posture, activity and strap tension [2-7].

Materials and methods: We used the F-Socket 9801 pressure sensor and the MatScan Research BETA STAM v. 6.30 software (TekScan, Boston MA, USA), and measurements were taken in nine body postures. The patients were divided into three groups: those who were wearing for first time the brace, those who changed their brace with a new one and those who made corrections on their brace.

Results: Changes in strap tension, body posture, resulted in statistically significant alterations of the interface pressure on the pads and thus of the resultant forces exerted on the patient's body by the pads. Comparing the three groups in relation with the magnitude of the mean exerted force, the correction of the brace caused the highest mean exerted force.

Conclusions: Even though the TekScan system does not provide direct information on the correction of spinal curvature, it appears to be a useful tool in the treatment of scoliotic patients. Also, the analysis of the corrective forces seems to be very helpful trying to achieve brace's optimal fit and the same time the best therapeutic result for the patient.

References

O32
Differentiated approach to Chêneau brace choice for the scoliosis treatment
D Chekhrychev1, A Mezentsev1, D Petrenko2
1Orthospine Ltd, Kharkiv, Ukraine; 2Sytenko Institute of Spine and Joint Pathology, Kharkiv, Ukraine
Scoliosis 2012, 7(Suppl 1):O32

Background and purpose: To validate choice of the Cheneau brace according to scoliotic deformity type.

Materials and methods: Study group included 1700 patients with AIS treated by Cheneau brace [1]. Major deformity Cobb angle ranged 20°-40°, spinal rotation ranged 15°-35°. Age of the patients was ranged 11-15 years old. Radiologic measurements and clinical presentation of the spinal deformity during the investigation were assessed [2]. Mean follow-up was 5 years. In this study Rigo's clinical and radiological criteria [3] and SRS terminology were used.

Results: According to obtained data four scoliotic deformity patterns were defined: primary thoracic and secondary lumbar/thoracolumbar curve (pattern 1); primary thoracolumbar and secondary lumbar curve (pattern 2); primary lumbar curve with/without secondary thoracic curve (pattern 3); triple curve deformity (pattern 4). This classification allowed to define following 6 brace types: for 1 pattern - braces of TL, T2, T3 types, For 2 pattern - brace T3 type; for 3 pattern - braces of L1, L2, TL and T2 types. For 4 type pattern - brace of CTL type.

Conclusions: Cheneau brace classification provides differentiated Cheneau brace selection according to the deformity pattern.

References

O33
Early results of Rigo-Chêneau type brace treatment
T Maruyama1, Y Nakao, H Yamada
Satama Medical Center, Satama Medical University, Kawagoe, Japan
Scoliosis 2012, 7(Suppl 1):O333

Background: We have been using Rigo-Chêneau type brace for the treatment of idiopathic scoliosis since 2007 [1,2]. Curves other than the upper thoracic main curve were the subjects of the treatment. Most patients wore their brace as part-time, at home or at night.

Purpose: To evaluate early results of Rigo-Chêneau type brace treatment.

Materials and methods: A total of 54 patients, 49 females and 5 males, were included in the analysis. Average age at the beginning of the treatment was 12.5 years (10 to 15). Risser sign was 0 in 15, I in 9, II in 15, III in 5 and IV in 10 patients. Curve pattern was thoracic (T) in 25, thoracolumbar or lumbar (TL) in 10 and double (D) in 19 patients.

Results: Average Cobb angle before treatment was 36.5°, which was reduced in the trial brace to 23.2°; correction rate was 36% (34% for T, 69% for TL, and 31% for D curve). Of 54 patients, 20 met the inclusion criteria of the SRS brace study (Risser 0-2, Cobb angle 25-40°), and 6 of them reached skeletal maturity during the treatment period. Three of them (50%) progressed more than 6°; however, only one patient progressed more than 10°.

Conclusions: Although early experience suggested better results than the natural history, accumulation of data will be necessary to determine the effectiveness of the treatment with Rigo-Chêneau type brace.

References

O34
Determining clinical significance independently from statistical significance? Implications for practice
S Schreiber1,2, EC Parent3, DM Hedden4
1University of Alberta, Faculty of Rehabilitation Medicine, Edmonton, Canada; 2University of Alberta/Alberta Health Services, Edmonton, Canada
Scoliosis 2012, 7(Suppl 1):O34

Objective: To present two proposed methods for determining clinically significant effects and describe each by using the same example from the scoliosis literature where statistical significance was not obtained.

Background: In science, statistics are universally used for making an inference about a population from sample data. The purpose of statistical inference is to determine if a proposed null hypothesis can be rejected, by comparing the probability of an observation to occur under the null
hypothesis (p-value) to a chosen alpha level of confidence. The null hypothesis is rejected if the p-value is smaller than alpha. The current focus on null hypothesis statistical significance testing in published work perpetuates confusion between statistical significance and clinical importance. Clinically, there are shortfalls to relying only on statistical inference.

Materials and methods: A review of the Pubmed literature revealed several methods for assessing the significance of a clinical effect [1][2]. Two methods will be presented because they are easy to calculate and all variables needed for calculation were available from the scoliosis literature: Half standard deviation rule of thumb and a method combining cut-off points and reliable change index (RCI). Both methods are presented using an example from the scoliosis literature on the effect of exercises where statistical significance was not obtained.

Results: The proposed methods, although mathematically different, are more similar than different in terms of the conclusions they produce.

Conclusions: A combination of statistical and clinical significance determination methods to draw statistically and clinically relevant inferences should be used when reporting clinical study results.

References

O35 Websites recommended to patients with adolescent idiopathic scoliosis at first point of diagnosis: a content analysis
S Wellburn1, J Betty-Saltikov, D Martin, P Van Schaik
Teesside University, Middlesbrough, UK
Scoliosis 2012, 7(Suppl 1):O35

Purpose: To examine the content of websites suggested to Adolescent Idiopathic Scoliosis patients by clinicians at fourteen specialist UK scoliosis centres.

Background: To support information provided during consultation health professionals commonly recommend other sources of information material. The use of electronic means to access health information is becoming more popular as the Internet becomes more widely available [1]. The problem is not in finding information but in assessing the validity and credibility of that information.

Materials and methods: Eight websites, SAUK, BSS, SRS, BSRF, BASS, Eurospine, Medikidz and iScoliosis, identified from previous clinician survey responses at the scoliosis centres, were recommended to patients. These were analysed for content and relevance using the DISCERN instrument [2].

Results: Information was found to be lacking on most websites, detailing how different treatments work, their benefits and risks and how these treatments may affect the quality of life of patients. The source of the information supplied on the websites and the date it was produced was rarely identified. Information regarding the signs, symptoms and aetiology of the condition was well presented.

Conclusions: The websites that are recommended to patients should contain up to date evidence-based information that is impartial and written in plain language. They should also contain material that has been designed to meet the information needs of patients Healthcare professionals need to be fully aware of the content of the websites they recommend, to enable them to suggest the most appropriate information sources.

Acknowledgements: This work was supported by the British Scoliosis Research Foundation Registered Charity NO 803772.

References

O36 Information provided to patients with adolescent idiopathic scoliosis (AIS) at the first point of diagnosis in the hospital clinic: a survey of UK NHS scoliosis consultants
J Betty-Saltikov1,*, D Martin, S Wellburn, P Van Schaik
Institute of Health and Social Care, Middlesbrough, UK
Scoliosis 2012, 7(Suppl 1):O36

Purpose: The purpose of this survey was to determine what information is currently provided by NHS scoliosis centres in the UK at the point of first diagnosis of patients with AIS [1].

Background: Service users’ health information needs are very frequently not addressed in hospital clinics. The role of the patient as an active partner in health care is now widely accepted and providing information to patients is considered fundamental [2].

Material and methods: An electronic survey was emailed to senior consultants at 30 key scoliosis centres in the UK. The survey covered questions relating to the most common questions asked by service users when first diagnosed, whether any written information was provided and who had written this and whether patients were referred to any relevant web sites.

Results: The response rate was 47%. The most common questions asked by service users related to aetiology (22.5%) prognosis (42.6%) general treatment (16.8%) surgery (12.4%) and parental guilt (5.6%). 78.6% of consultants said that patients were provided with written information provided by a member of staff and written by the Scoliosis Association UK in 61.5% of cases. 92% of consultants referred patients to relevant web sites. Surgeons stressed the importance for information to be evidence-based, address patients anxieties and counselling needs, provide clear natural history information and address ways of contacting other patients with AIS who have or have not undergone surgery.

Conclusions: AIS patients at the point of first diagnosis at hospital are provided with relevant information or referred to relevant web-sites in a significant number of scoliosis UK centres. Further studies are in progress to evaluate patients’ perceptions on the quality and format of information currently provided by NHS scoliosis centres.

Acknowledgements: This work was supported by the British Scoliosis Research Foundation Registered Charity NO 803772.

References

O37 Prevalence of adolescent idiopathic scoliosis among primary school children in Canakkale, Turkey
H Yilmaz1,*, C Zaten1, S Vuruc2, C Bakar2
1Canakkale Onsekiz Mart University PMR Department, Canakkale, Turkey; 2Canakkale Onsekiz Mart University Canakkale, Turkey
Scoliosis 2012, 7(Suppl 1):O37

Background: Adolescent idiopathic scoliosis (AIS) is an important health problem among school children. There are a few study performed to determine prevalence of AIS. However, reported rates are many different. We aimed to determine prevalence of AIS in Canakkale.

Materials and methods: The universe of our study was chosen from primary school students. The sample size was calculated separately for provinces and districts, 1321 and 1420, respectively. We chose 12 schools totally by cluster sampling method. Presence of AIS was evaluated with scoliometre and posture analysis. Students who have skeletal deformity or other major skeletal surgery history were excluded. SPSS 15.0 was used for analysis.

Results: We reached a total of 2604 students. We found47 (1.8%) students with suspected AIS. All of the suspected students were invited to the hospital to assess with x-ray. 26 (61.7%) of all students came to the hospital and we found 8 students have AIS. The data presented in this study are the preliminary results. Student evaluation is ongoing. We aim...
to reach all the suspected cases. Then, we will notify the prevalence of AIS among primary school children in Canakkale.

**Conclusions:** Idiopathic scoliosis is classified as infantile, juvenile and adolescent depending on the age at first diagnosis. Extremely rare in infancy and early childhood but has a prevalence of 1% to 2% among school children up to age 15. We aimed to determine the frequency of AIS in the risk population of those aged 7-14 years and providing a base for large-scale studies.

**O38**

**Isokinetic trunk strength in the teenagers with and without low-back pain: a comparative study**

JC Bernard¹, A Pujo, S Bodoukhane, J Decueurinck, E Chaleat-Valayer

Croix Rouge française-CMCR des Massues, Lyon, France

Scoliosis 2012, 7(Suppl 1):O38

**Objectives:** To evaluate isokinetic trunk strength in low-back pain (LBP) teenagers, its relations with the clinical measures, and comparison analysis with healthy teenagers.

**Materials and methods:** This study has included two groups of 22 LBP and 22 healthy teenagers, aged 11-13 years. We have measured the isokinetic trunk strength in each group on the Cybex trunk extension/flexion machine.

**Results:** No significant difference was found between isokinetic peak torque, total work and mean power in extension and flexion in the two groups. Other than, the control group had a higher mean power extension in 120°'s than the LBP group with a nearly significant p. Significant correlations between isokinetics total work at 120° in flexion (r=0.461) and in extension (r=0.475) were observed with the body mass index. A high correlation was also found between the total work at 120° in extension (r=0.668) and the number of hours per week of sport activities. The mean power in extension at 120°'s was correlated positively (r=0.453) to the lumbar radiological lordosis. The endurance of agonist (flexors) and antagonist (extensors) ratio was high in both populations compared to the expected values in general population (0.91 vs 0.89).

**Conclusions:** This study reveals no significant difference in the isokinetic trunk strength of both flexors and extensors in the two groups. Based on the results, its interest to study the effect of isokinetic rehabilitation to remove the inhibition at high speed. Isokinetic strength parameters, as measured in this study, do not seem to explain the occurrence of low back pain among children.

**O39**

**SpineCor treatment – the Spanish experience. First results**

C Herrero*, E Herrero

Centro de Traumatología y Ortopedia Pediátrica y del Adolescente (CTPA), Girona, Spain

Scoliosis 2012, 7(Suppl 1):O39

**Purpose of the study:** The purpose of this study was to evaluate the effectiveness of the Dynamic SpineCor brace as a new treatment for adolescent idiopathic scoliosis [1,2].

**Materials and methods:** 117 scoliotic patients at our clinic accepted the SpineCor brace and 34 (30 females and 4 males) have already finished the treatment. Assessment of brace effectiveness included percentage of patients who have 5° or less curve progression and the percentage of patients who have 6° or more progression at skeletal maturity. We employed the SRS22 and CAVIDRA questionnaire for the evaluation of patients’ quality of life while using the SpineCor System.

**Results:** Success of the treatment (stabilisation or correction) was achieved in 88.3% of patients and only 11.7% had a progression of their Cobb angle. Out of 34 patients, 18 (52.9%) had a correction and 12 (35.3%) had a stabilisation of their initial Cobb.

**Conclusions:** The SpineCor brace is an effective treatment for the adolescent idiopathic scoliosis. Even though until now we have a small number of patients treated, the results are extremely promising.

**References**


A statistical approach to electronic moulding versus traditional plaster moulding
JC De Mauroy1, F Barral2, C Lecante3
1Clinique du Parc, Lyon, France; 2Groupe Lecante, Lyon, France
Scoliosis 2012, 7(Suppl 1):O42

Background: Electronic moulding tends to gradually replace the plaster moulding. Is it as effective?

Materials and methods: The angular correction of 166 plaster moulding scoliosis was compared with the correction of 117 electronic moulding scoliosis. Both mouldings were made by the same physician. The electronic moulding has been produced using the full 3D system ORTEN. The curves have been grouped into thoracic (n=127), thoraco-lumbar (n=65) and lumbar (n=206).

Results: 1) The average initial angle is: 28,19 (+-9,21) for thoracic, 28,11 (+-9,34) for thoraco-lumbar and 25,86 (+-7,04) for lumbar curves. 2) The angular reducibility is 54 % in braces for the thoracic curvatures, 69 % for the thoraco-lumbar curvatures and of 73 % for the lumbar curvatures, which corresponds to the usual results of the Lyon management. If we select curves of 30° and more the reducibility is respectively: 48.5 % for thoracic, 67 % for thoraco-lumbar and lumbar curves. 3) The reducibility in brace is better for the group of the electronic moulding than for the group in plaster cast. For all cases, the improvement of reducibility is 3,63° for thoracic, 3,02 for thoraco-lumbar and 2,14° for lumbar curves. This improvement is better if we select the initial curves of 30° and more: respectively 5,44° for thoracic, 4,75° for thoraco-lumbar and 3,89° for lumbar curves. This difference is however not statistically significant.

Conclusions: Such results are in favour of the electronic moulding, which remains however delicate and require a precise position of the patient during the surface topography and well trained orthotic technicians.

O43
Abstract withdrawn

Scoliosis 2012, 7(Suppl 1):O43

Effectiveness of Chêneau brace treatment for idiopathic scoliosis: prospective study in 79 patients followed to skeletal maturity
I Kowalski1, K Zaborowska-Sapeta2, T Gągiewski3, T Kotwicki4, H Protaszewicz-Faldowska1, W Kiebzak5
1Department of Rehabilitation, Faculty of Medical Sciences, University of Warmia and Mazury, Olsztyn, Poland; 2Institute of Electrical Engineering and Electrotechnologies, Faculty of Electrical Engineering and Computer Science, University of Technology, Lublin, Poland; 3Department of Pediatric Orthopedics and Traumatology, University of Medical Sciences, Poznan, Poland; 4Institute for Physiotherapy, Faculty of Medical Sciences, University of Kielce, Poland
Scoliosis 2012, 7(Suppl 1):O44

Background: Progressive idiopathic scoliosis can influence negatively the development and function of 2-3% of adolescents, with health consequences and economic costs, placing the disease in the centre of interest of medicine of the growing age. The aim of this study was to evaluate the effectiveness of Chêneau brace in the management of idiopathic scoliosis.

Materials and methods: A prospective observational study according to SOSORT and SRS recommendations comprised 79 patients (58 girls and 21 boys) with progressive idiopathic scoliosis, treated with Chêneau brace and physiotherapy, with initial Cobb angle between 20 and 45 degrees, no previous brace treatment, Risser 4 or more at the final evaluation and minimum one year follow-up after weaning the brace. Achieving 50° of Cobb angle was considered surgical recommendation.

Results: At follow-up 20 patients (25.3%) improved, 18 patients (22.8%) were stable, 31 patients (39.2%) progressed below 50 degrees and 10 patients (12.7%) progressed beyond 50 degrees (2 of these 10 patients progressed beyond 60 degrees). Progression concerned the younger and less skeletal mature patients.

Conclusions: Conservative treatment with Chêneau orthosis and physiotherapy was effective in halting scoliosis progression in 48.1% of patients. The results of this study suggest that bracing is effective in reducing the incidence of surgery in comparison with natural history.

O45
Rate of surgery in patients under treatment with a Chêneau light brace using the SRS inclusion criteria
M Werkmann1, HR Weiss2
1Scolocare Orthomed, Gensingen, Germany; 2Orthopedic Rehabilitation Services, Gensingen, Germany
Scoliosis 2012, 7(Suppl 1):O45

Background: Studies investigating the outcome of conservative scoliosis treatment differ widely with respect to the inclusion criteria used. Prospective cohort studies are available using the SRS inclusion criteria for studies on bracing [1,2]. This seems to provide a great advantage to compare different strategies of bracing among other. As we have gathered all data of the patients treated with a Chêneau light™ between June 2005 and November 2007 it was possible to identify the sample of patients fulfilling the SRS inclusion criteria from the whole sample.

Materials and methods: 34 patients (of 152) fulfilled the SRS inclusion criteria with an average age of 12.06 years (10 – 13 years), average Cobb angle of 31 degrees (25 – 40°), an average Risser stage of 0.35, average in-brace Cobb angle of 13° (= 59% of in-brace correction). There were 17 thoracic, 10 double major, 6 lumbar and 2 thoraco-lumbar curve patterns. After change of workplace of the second author the patients could not be followed up as planned. Therefore a telephone interview was performed by the first author.

Results: 28 patients (average age 16.5 years) have been reached, 9 of them were still under treatment. No patient has been operated (Rate of surgery 0%) and only one was not satisfied with cosmetic outcome found.

Discussion: Rate of surgery was far less reported in recent studies using the same inclusion criteria even when all drop outs where rated as failures [1,2].

Conclusions: Rate of surgery can be reduced with the help of Chêneau braces of the latest standard and satisfactory in-brace correction.

O46
 Included or excluded pelvis - does the inclusion of the pelvis in the scoliotic process influence the outcome?
A Circo1, C Coillard, C Rivard
1Sainte Justine Hospital, Montreal, Canada
Scoliosis 2012, 7(Suppl 1):O46

Background: Even though scoliosis is principally a deformity of the spine and the rib cage, some authors demonstrated that the pelvis can be
included in the scoliotic process. Bernard Bricot concluded that the patients that presented with an excluded pelvis have a more evolving scoliosis. With regards to the pelvis we have two categories: the pelvis is excluded or included in the scoliotic process. In the first case the pelvis should be perfectly balanced, whereas in the second group we can find a tilt, torsion or rotation of the pelvis.

The purpose of this retrospective cohort study was to verify if the inclusion of the pelvis has an influence for the outcome of the treatment.

**Materials and methods:** Two groups were studied: first group composed of 77 patients that needed surgical treatment compared to the second group composed of 101 consecutive patients seen in the clinic and treated with SpineCor in 2003-2004 [1,2].

**Results:** In the first group 16 out of 77 patients (20.8%) had an included pelvis compared to the control group where 22 out of 101 (21.8%) had an included pelvis. Most of the patients with an included pelvis in the control group had a thoraco-lumbar curve compared to the surgery group where the majority was thoracic and double curves.

**Conclusion:** There is no difference in the outcome of the treatment of patients with included or excluded pelvis and it seems that regardless of the outcome, the same percentage of 21% of patients had an included pelvis.

**References**

---

**O47**

**Conservative treatment results of 39 patients with adolescent idiopathic scoliosis**

H Yilmaz, T Kuru

1*Kanalakale Onsekiz Mart University PMR Department, Canakkale, Turkey; 2*Istanbul University, School of Physical Therapy and Rehabilitation, Istanbul, Turkey

**Scoliosis** 2012, 7(Suppl 1):O47

**Background:** Scoliosis conservative treatment’s goal is to maintain function, and prevent symptoms in the short and long-term and protect the health related quality of life. The purpose of this study was to analyze our conservative treatment results.

**Materials and methods:** 39 patients with AIS who did receive a conservative treatment method included in the study allocated into three groups. 35 of our patients were female and 4 were male. 4 patients with 20° Cobb angle enrolled into first group (exercise group). 24 patients did not want to receive an exercise programme so they included in 2. group (brace group). All of the patients worn CAD/CAM system-Chêneau-brace. 11 patients in the 3. group worn brace and participated outpatient exercise programme. The mean 3 months changes -Treatment results- of three groups were analysed with SPSS.

**Results:** There were significant within-group pre-post treatment improvements of Cobb angle for brace and brace-exercise group. Analyses showed no significant differences in other parameters (see Table 1).

**Conclusion:** In the conservative treatment of AIS, making the right decision about patient, brace and exercise is very important.

Our study have some limitations, our follow up time was short and we did not have enough patients in each group so we could not compare groups results.

---

**Table 1(abstract O47) Treatment results after 3 months**

<table>
<thead>
<tr>
<th>Treatment groups</th>
<th>Variables</th>
<th>Before treatment Mean ± SD</th>
<th>After treatment Mean ± SD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exercise and brace group (n:11)</strong></td>
<td>Max Cobb°</td>
<td>34.38±9.24</td>
<td>29.37±10.86</td>
<td>0.024</td>
</tr>
<tr>
<td></td>
<td>Vertebral rotation°</td>
<td>10.63±5.67</td>
<td>9.57±5.62</td>
<td>0.162</td>
</tr>
<tr>
<td></td>
<td>Rib Hump°</td>
<td>15.55±9.70</td>
<td>11.66±8.01</td>
<td>0.120</td>
</tr>
<tr>
<td><strong>Brace group (n:24)</strong></td>
<td>Max Cobb°</td>
<td>34.00±8.56</td>
<td>28.60±10.24</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Vertebral rotation°</td>
<td>8.82±4.59</td>
<td>7.21±4.46</td>
<td>0.072</td>
</tr>
<tr>
<td></td>
<td>Rib Hump°</td>
<td>24.18±14.62</td>
<td>19.25±12.76</td>
<td>0.328</td>
</tr>
<tr>
<td><strong>Exercise group (n:4)</strong></td>
<td>Max Cobb°</td>
<td>20.56±3.00</td>
<td>19.28±1.00</td>
<td>0.664</td>
</tr>
<tr>
<td></td>
<td>Vertebral rotation°</td>
<td>5.50±1.29</td>
<td>4.52±2.12</td>
<td>0.205</td>
</tr>
<tr>
<td></td>
<td>Rib Hump°</td>
<td>4.00±6.92</td>
<td>4.26±3.54</td>
<td>0.653</td>
</tr>
</tbody>
</table>

---

**Objectives:** The purpose of this retrospective study was to investigate whether treatment with a carbon brace stops the progression of idiopathic scoliosis in children and adolescents affected by combined or thoraco-lumbar scoliosis.

**Background:** The carbon brace is a single shell corset whose supports are defined according to the x rays and a 3D reconstruction [1]. Their mobility results from using carbon adjustable strips. The study was carried on a population of 115 scoliotic children whose average age is 12.5.

**Material and methods:** We compared clinical features and radiographic data at brace set-up and removal in 115 patients with combined or thoracolumbar scoliosis. The impact of the brace was evaluated in 2 subgroups according to their Risser stages. With 95 patients, a questionnaire was used to evaluate the physical and psychological tolerance of the brace.

**Results:** At brace set-up, the immediate angular correction was about 50% compared to the pre-brace angle; the reduction of the vital capacity was weak. After brace removal, radiographic data showed significant improvement in thoraco-lumbar and lumbar curves of patients with combined scoliosis, although the thoracic curvature of the combined scoliosis was unchanged. No significant efficiency on the hump was observed.

**Conclusions:** The CMCR can stop the progression of moderate combined or thoracolumbar scoliosis during growth, this type of orthosis provides a better outcome in terms of thoracic mobility and vital capacity, but have little efficacy on the hump. The CMCR brace is indicated for patients with flexible scoliosis. This “mobile” brace has definitely its place in the current therapeutic arsenal.

**Reference**
**O49**

Mobilization exercises in preparation to bracing must be only at start of brace wearing. Results from a prospective controlled study

M Romano*, A Negrini, S Parzini, S Donzelli, F Zaina, S Negrini
SISCO, Milan, Italy

Scoliosis 2012, 7(Suppl 1):O49

**Purpose/background:** Some exercises protocols (SEAS, Lyon) for scoliosis patients before brace wearing require a period of mobilization exercises to reduce spine and muscle stiffness, and obtain a better action of the brace [1,2]. Aim of this study is to define when these exercises should be applied to achieve the best results of bracing.

**Materials and methods:** Population: 357 consecutive scoliosis patients with 23 hours per day brace prescription (299 females, Age 13.2±11.1 ° Cobb: 41.4±9.5, Risser 1.2±1.2). Control: out-of-brace 6 months x-ray. The 206 SEAS patients have been divided according to time elapsed between start of mobilization exercises and start of brace wearing. We also had two control groups: one Usual Physiotherapy (UP: 115) and no No exercises (NE: 36) Statistical analysis: Anova, T-Test and Relative Risk.

**Results:** At baseline there were some differences, with the SEAS patients worst than UP and NE. All patients in all groups improved in almost all parameters with brace treatment (more in SEAS than UP and NE). Best results (statistically significant for Cobb degrees, ATR and Trace in comparison with other SEAS groups, but also with UP) and NE have been obtained by patients who performed mobilizing exercises almost at the same time with start of bracing.

**Conclusions:** Despite our starting idea, that spinal mobilization exercises should start at least two months before bracing, our results show that they are more effective when patients perform this protocol at the same time in which they start wearing the brace. This drove to change SEAS protocol accordingly.

**References**


**O50**

Adolescent with 10° to 20° Cobb scoliosis during growth: efficacy of conservative treatments. A prospective controlled cohort observational study

M Romano*, A Negrini, S Parzini, S Donzelli, F Zaina, S Negrini
ISICO, Milan, Italy

Scoliosis 2012, 7(Suppl 1):O50

**Purpose/background:** Usually scoliosis between 10° and 20° are not treated: in some Centres conservative preventive treatment is provided [1] [2]. Aim of this study is to compare results of different type of treatments.

**Materials and methods:** Population: 288 consecutive scoliosis patients over 10 years of age, curves range 10-20°, Risser 0-3 (190 Females, Age 12.8±1.5). We had 5 groups:
- Brace (BG, 40 patients): bracing 18 hours per day
- SEAS (101 patients): specific SEAS exercises (at least 3 controls per year)
- Usual Physiotherapy (UP, 70 patients): different type of exercises
- Not Compliant (NC, 46 patients): SEAS exercises 2 (or less) controls per year
- Controls (CG, 31 patients): no treatment.

Main outcome (after 12±4 months): Relative Risk of failure of treatment (worsening of 5°C or brace prescription).

**Results:** At baseline BG differed from the other groups for almost all parameters. In BG failures were 10%, improvements 45%; in SEAS 16% and 30% respectively.

When compared to SEAS (and not considering BG), Relative Risk of failure was statistically significantly increased in CG (1.9, IC95 1.28-2.53) and NC (2.02, IC95 1.34-2.70), but not in UP (1.52, IC95 0.91-2.13). All patients other than SEAS had an increased Relative Risk of failure (1.74, IC95 1.22-2.26).

**Conclusions:** Conservative treatment with Brace or SEAS consistently reduce the risk of progression.

**References**


**O51**

The effect of a four-week intensive scoliosis-specific exercises programme on Cobb angle in subjects with idiopathic scoliosis: an 11 patient case series

E Maude*, J Head, K Hobson
Scoliosis SOS Clinic, Martlesham, UK

Scoliosis 2012, 7(Suppl 1):O51

**Background:** Current management for scoliosis in the UK is dictated by a patient’s Cobb angle. This case series aims to investigate whether a four-week intensive scoliosis-specific exercise programme results in a significant improvement in patient’s Cobb angle measurements.

**Materials and methods:** 11 patients (9 females, 2 male) with IS (9 thoracic curve patients and 5 thoracolumbar/lumbar curve patients) and a mean age of 16.45 years (Range 7-36 years) were treated with a four-week intensive scoliosis-specific physiotherapy course (ScolioGold). Patients’ initial x-rays were supplied in retrospect and follow-up x-rays gathered after patients’ routine check-up appointments. Each x-ray was taken by an independent radiographer and all x-rays measured by the same rater.

**Results:** Mean thoracic Cobb angle before treatment was 44.89° (SD12.41°, Range 19°-60°) while mean thoracolumbar/lumbar Cobb angle before treatment was 45.60° (SD5.55°, Range 41°-55°), post treatment this reduced to 36.22° (SD12.17°, Range 10°-50°) for thoracic curves and 33.80° (SD9.42°, Range 21°-44°) for thoracolumbar/lumbar curves. This is a reduction in thoracic curves of 8.99° (SD2.37° Range 5°-12°) conversely this equates to a 21.96% reduction (SD11.23%, Range 12.2%-47.37%) and 11.8° in thoracolumbar/lumbar curves (SD5.85° range 4°-20°) conversely this equates to a 26.64% reduction (SD 15.11%, range 8.89%-48.78%).

**Conclusions:** With the significance level for Cobb angle reduction set at 5° degrees, these changes show a significant improvement in this case series. Results substantiate the use of intensive exercise methods (ScolioGold) in the treatment of IS patients with the aim to reduce the Cobb angle and add to the growing body of evidence for scoliosis-specific physiotherapy.

**O52**

Does a four-week intensive scoliosis-specific exercises programme improve body-image in subjects with idiopathic scoliosis and is the effect rated equally by patients, physiotherapists and an external rater with scoliosis?

J Head, E Maude, J Black, T Rolfe, R Dorman
Scoliosis SOS Clinic, Martlesham, UK

Scoliosis 2012, 7(Suppl 1):O52

**Background:** Improving trunk appearance is important for scoliotic patients. Selecting an appropriate rater is vital for effectively measuring this outcome. This study investigates whether a four-week intensive scoliosis-specific exercise programme results in improved patient body image and how this varies between patients, physiotherapists and an external scoliotic rater.

**Materials and methods:** 82 patients (70 females 12 males) with IS and mean age 30.79 years (Range 10-81) were treated with a four-week intensive scoliosis-specific physiotherapy course (ScolioGold). Patients, 2 blinded physiotherapists and a blinded scoliotic rater rated patients' body-image
before and after treatment. Body-image was assessed using a 0-10 scale, for 5 elements (Head, Shoulders, Ribs, Waist and Hips).

**Results:** Mean total scores before treatment were; patients 28.51 (SD8.76), physiotherapists 22.94 (SD6.01) and external rater 20.55 (SD7.27) and after treatment were; patients 15.46 (SD7.40), physiotherapists 13.73 (SD5.88) and external rater 6.61 (SD4.10). Differences in patients (P), physiotherapists (T) and external rater (E) body-image scores were found to have statistically significantly improved after treatment using Wilcoxon-signed rank test (p<0.001, p<0.001, p<0.001). ICC scores between P&T, P&E and T&E were; fair (0.28), slight (0.19) and moderate (0.58) before treatment and fair (0.28), moderate (0.59) after treatment.

**Conclusions:** Statistically significant improvements between pre-post treatment scores substantiate intensive exercise methods (ScolioGold), in the treatment of IS-related negative body image. Significant variation between patients' physiotherapists' and external rater's scoring heightened the need for patients to rate body-image due to the subjectivity of this outcome measure, to ensure we adopt a client-centred care approach in our treatment goals to improve patient body-image.

---

**O53**

**An algorithm for determining scoliosis curve type according to Schroth**

**Background:** Schroth exercises are scoliosis specific [1,2]. They are the most researched and have been shown to lead to good outcomes. The Schroth classification consists of four mutually exclusive curve type categories (3c, 3cp, 4c and 4cp). Patients with scoliosis are classified according to their clinical presentation by a certified Schroth therapist. Observing the alignment of the following body blocks guides the classification assessment: lumbar spine and pelvis, thoracic spine and rib cage, and the cervical spine, head and shoulder girdle. Classifying patients' curve types within the four Schroth curve categories determines the appropriate exercise prescription for a patient. An algorithm is needed to minimize errors in classifying different scoliosis patterns and help standardize exercise prescription.

**Materials and methods:** Using the Schroth classification instructions described by Hennes, A. (2008, 2009), two certified Schroth research therapists and a physiotherapy professor developed the proposed algorithm and a set of operational definitions and instructions with respect to:
- major curve location
- body blocks rotation
- relative position of the pelvis and lumbar block
- prominent hip location
- body weight balance

**Results:** A refined algorithm for determining the scoliosis curve type according to Schroth is proposed for use in a randomized clinical trial.

**Conclusions:** Using the proposed algorithm may help prevent treatment failure by minimizing incorrect classification and exercise prescription. The algorithm can help clinicians correctly classify curves, which then allows an appropriate exercise prescription.

**References**


---

**O54**

**Proposal for the SOSORT inclusion criteria for studies on physiotherapy**

**Background:** Studies investigating the outcome of conservative scoliosis treatment differ widely with respect to the inclusion criteria used [1]. While the application of the SRS criteria for studies on bracing seem useful, there are no inclusion criteria for the investigation of physiotherapy alone. This study has been performed to investigate the possibility of useful inclusion criteria for future prospective studies on physiotherapy (PT).

**Materials and methods:** A PubMed and (incomplete) hand search for outcome papers on PT has been performed in order to detect study designs and inclusion criteria used.

**Results:** Real outcome papers (start of treatment in immature samples / end results after the end of growth) have not been found. Some papers investigated mid-term effects of exercises, most were retrospective, few prospective [2] and some included patient samples with questionable treatment indications [3].

**Discussion:** An agreement of the scientific community on common inclusion criteria for future studies on PT is necessary. We would suggest the following: (1) girls only, (2) age 10 to 13 with the first signs of maturation ( Tanner III), (3) Risser 0-2, (4) risk for progression 40 – 60% according to Lonseth and Carlson.

**Conclusions:** A SOSORT consensus paper following a 3-step Delphi process seems necessary in order to establish the inclusion criteria for future studies on PT.

**References**

Acknowledgements: This paper is a part of a research project DS.136, University School of Physical Education, Warsaw, Poland.

References

O56

Mobilisation of neural structures opens up new possibilities for idiopathic scoliosis treatment
E Santos Legal
Psychotherapiecenter, Iserlohn, Germany
Scoliosis 2012, 7(Suppl 1):O56

Background: Idiopathic Scoliosis (IS) is a progressive disorder with reduced mobility of the spine. This makes corrections difficult or sometimes even inhibits postural changes. Even when correction of frontal or coronal plane deformity seems successful, sagittal correction mostly is not addressed appropriately. This might be due to functional tethering of the spinal cord or even of peripheral neural structures. This explains the lack of success when trying to correct sagittal plane deformity with the help of stretching exercises. Purpose of this study was to test how the release of these structures may relax lordotic tension in the thoracic area.

Materials and methods: Finger – floor distance and sciatic slump was tested in 25 patients before and after a session of physiotherapy using neural tension exercises (Butlen [1,2]).

Results: Significant differences have been achieved with the help of these techniques (16 – 21 cm at the start independent of patient age / 3-4 cm at the end) with improved kyphosation at the same time.

Conclusions: While in sole stretching of the hamstring the sagittal profile cannot be improved, neurodynamics provide an improvement of this deformity. Neurodynamics therefore seem to be a useful add on in the physical treatment of IS.

References

O57

Barcelona Scoliosis Physical Therapy School – BSPTS – based on classical Schroth principles: short term effects on back asymmetry in idiopathic scoliosis
M Jelačić, M Villagrassa, E Pou, G Quera-Salva, M Rigo
Institut Elena Salva, Barcelona, Spain
Scoliosis 2012, 7(Suppl 1):O57

Background: Previous results have shown the specificity of Schroth exercises (according to BSPTS protocol) but in a series including patients under bracing [1-4].

Objective: To investigate the short term effects of an intensive program of exercises on back asymmetry in idiopathic scoliosis with no other treatment.

Materials and methods: Retrospective, including 47 patients with IS treated exclusively with exercises. Mean age 18.64 ± 5.78 years. Outpatient Intensive Rehabilitation was carried out, three hours a day, five days a week, 4 weeks. Surface topography (Formetric) was performed to measure trunk imbalance, surface and lateral deviation before and after the treatment period. The obtained pre- and post-treatment values were then compared.

Results: The mean trunk imbalance prior to and after the treatment was 10.16 mm and 8.53 mm respectively (p<0.05). The pre-treatment mean value of the lateral deviation (rms) was 13.92 mm, compared to the post-treatment one of 11.96 mm (p<0.05) and of the lateral deviation (max) was 25.6 mm and 21.42 mm respectively (p<0.05). The mean initial value of the surface rotation (rms) was 6.88 degrees, reaching 6.52 degrees at the end of the treatment (p<0.05) and of the surface rotation (max) 13.22 degrees and 11.88 degrees respectively (p<0.05).

Conclusions: Current results suggest that exercises according to Schroth principles, following BSPTS protocol, are able to improve back asymmetry, spinal imbalance in the frontal plane and virtual spinal geometry in a short term, confirming specificity in its mechanics of action.

References

O58

Short-term effects by using additional methods in DOBOMED preparation phase for AIS double major patients – pilot study
B Wnuk , J Durmala , J Dzierzega , K Dydula , S Dydula , K Wadolowski
1Medical University of Silesia, Poland; Katowice, Poland, 2University Hospital - Silesia Medical Center, Katowice, Poland
Scoliosis 2012, 7(Suppl 1):O58

Objective: To investigate the short term effects of an intensive program of exercises in DOBOMED preparation phase for AIS double major patients.

Materials and methods: Thirty-five girls with AIS double major (mean Cobb’s angle – Th=270±7,5; L=240±5,6) were divided for two randomized groups during 3 weeks. In group A was applied only standard DoboMed [1]. In group A-plus was applied triple method (DoboMed + OMT Kaltenborn-Evjenth + Dynamic Brace System –Meditrac). The derotation manual therapy techniques and Meditrac were used in DoboMed preparation phase. Meditrac was used only in the part of lumbar spine once a day during 30 minutes. The stationary intensive rehabilitation for both groups have been continued during 3 weeks.

Results: Significant differences have been achieved with the help of these techniques (16 – 21 cm at the start independent of patient age / 3-4 cm at the end) with improved kyphosation at the same time. Significant differences have been observed in the respiratory function (spiroometry-VC, FEV1, PEFR), the strength of respiratory muscles (maximal inspiration and expiratory pressures- MIP, MEP), the trunk morphology and function (kyphosis and range of spine motion by V-plummeter; the trunk rotation angle-ATR by Bunnell’s scoliometer). MIP and spine flexion values were increased significantly in both groups during therapy. In the group A-plus was observed more significant changes of parameters. Increasing of PEF, kyphosis, spine extension and lateral flexion values and decreasing of ATR were observed.

Conclusions: In the short time we were observed functionally and morphology improvement in-group of patients treated by DoboMed with OMT Kaltenborn-Evjenth and Dynamic Brace System –Meditrac. These additional methods have been used successfully in DoboMed preparation phase for AIS double major patients.

Reference

O59

The usefulness of the sum of rotation parameter in scoliosis screening
J Chodawska , T Kotwicki
1RehavSport Clinic, Poznań, Poland; Spine Disorders Unit, Department of Pediatric Orthopedics and Traumatology, University of Medical Sciences, ul. Poznan, Poland; 2Spine Disorders Unit, Department of Pediatric Orthopedics and Traumatology, University of Medical Sciences, Poznan, Poland
Scoliosis 2012, 7(Suppl 1):O59
Purpose of the study: It was to assess the usefulness of the Sum of Rotation parameter in scoliosis screening.

Background: The Sum of Rotation parameter (SR) represents the sum of absolute values of angles of trunk rotation (ATRs) measured with a scoliometer on three spinal levels: proximal thoracic, main thoracic and thoracolumbar/lumbar. This parameter is useful in following-up the patient during conservative scoliosis management, because it documents the global rotational trunk deformity [1-4].

Materials and methods: In a cohort of 996 school girls, aged 11.0 ± 1.0 years, range 9 to 13 years, the average, standard deviation, minimum and maximum values of SR were calculated separately for three distinct subgroups: (a) ATR 0°- 3°, (b) ATR 4° to 6° and (c) ATR ≥ 7°.

Results: The SR value was: (a) 0.9 ± 1.2, range 0.0° to 6.0°, N=870, (b) 5.5 ± 1.9, range 4.0° to 17°, N= 870, (b) 10.2 ± 3.3, range 7.0° to 20.0°, N= 32. Normal children with important SR values were identified (SR = 2° ±2°+2° = 6°).

Conclusions: The use of SR parameter seems not reveal additional information in scoliosis screening comparing to simple ATR measurement. Moreover, a risk of bias is present if the cut-off criterion of 7° is applied.

References


060 Position-dependent trunk asymmetry assessed with scoliometer

J Chowańska1*, T Kotwicki2, K Rosadzierski2
1Rehasport Clinic, Poznań, Poland; Spine Disorders Unit, Department of Pediatric Orthopedics and Traumatology, University of Medical Sciences, Poznań, Poland; 2Spine Disorders Unit, Department of Pediatric Orthopedics and Traumatology, University of Medical Sciences, Poznań, Poland

Scoliosis 2012, 7(Suppl 1):E60

Purpose of the study: It was to assess the influence of child positioning during examination with Bunnell scoliometer on value of angle of trunk inclination.

Background: During school screening for scoliosis the Angle of Trunk Inclination/Rotation (ATI/ATR) measurement is performed with the use of scoliometer. Early adolescent girls are the target group for scoliosis screening. Further evaluation is recommended when ATI is equal or above 7°. Standing forward bending position is a standard one, however sitting position is also advocated [1-7].

Materials and methods: The study comprised 996 girls, aged 9 to 13, mean 11.0 ± 1.0 years of age. ATI measurements were performed at three levels of the spine: proximal thoracic, main thoracic and thoracolumbar/lumbar. Maximal ATI values for standing and sitting forward bending positions were noted. Based on the “7°” criterion, the number of children who need follow up was revealed, according to position: (a) standing, (b) sitting, (c) any of standing or sitting, (d) either standing or sitting.

Results: On each level of the spine the ATI value was lower for the sitting forward-bending position than for the standing one. The prevalence of Bunnell ≥ 7° was as follows: (a) 3.9%, (b) 3.2%, (c) 4.5% and (d) 2.4%.

Conclusions: The value of ATI depends on body position during scoliometer measurement. Sitting position can be considered for the purpose of school screening for scoliosis, alone or as complement of the standing one.

References


061 Study on the impact of the angular value of scoliosis, the number and length of the curves on physical capacity of affected girls

D Czarzposki1*, T Kotwicki2, R Bernat3, A Ronikier3
1Faculty of Physiotherapy, Józef Rusiecki University College in Olsztyn, Poland; 2Faculty of Rehabilitation, Academy of Physical Education, Warsaw, Poland; 3Spine Disorders Unit, Department of Pediatric Orthopedics and Traumatology, University of Medical Sciences, Poznań, Poland

Scoliosis 2012, 7(Suppl 1):E61

Purpose of the study: To determine the influence of the scoliosis angle, the number and the length of the curves on physical capacity of affected girls.

Background: Physical capacity determines the organism’s ability to make a physical effort, to tolerate dysfunctions of endogenous homeostasis caused by the physical effort and to quickly regain balance [1,2]. Idiopathic scoliosis (IS) is a systemic disease affecting function of the cardiopulmonary system and impairing patient’s physical capacity [3,5,6].

Materials and methods: Ninety-seven girls, aged 10 to 18, seventy idiopathic scoliosis and 27 controls participated in the study. To determine the physical capacity, the indirect method comprising the PWC170 test was used and maximal oxygen uptake (VO2 max, l/min) was calculated [3,5]. Girls with moderate IS (Cobb 25°-40°) and mild IS (Cobb up to 25°) were analyzed separately.

Results: The VO2 max value (l/min) and the PWC170 index were significantly lower in girls with moderate IS compared to control group. No difference was found between mild IS and controls. No influence of the number of curves and the length of scoliosis on VO2 max (l/min; ml/kg/min) and the absolute capacity value (W) was found. A significantly lower value of the PWC 170(W/kg) index was observed in girls with double scoliosis and girls having the curve over 9 vertebrae.

Conclusions: Girls with moderate IS presented lower VO2 max compared to controls. Physical capacity of mild IS was not significantly different from controls. Girls with double scoliosis and girls having the curve over 9 vertebrae had a significantly lower value of the PWC 170 (W/kg) index, moreover no significant effects were found for VO2 max and PWC 170 (W).

References

O62
Respiratory muscle dysfunction and exercise limitation in patients with moderate adolescent idiopathic scoliosis
E Marco1,2, JM Martínez-Llorens3, SC Chiarella3, MF Donaire1, M Otooze-Levi4, F Escalada2

Scoliosis 2012, 7(Suppl 1)O62

Background: Adolescent idiopathic scoliosis (AIS) can lead to ventilatory restriction, respiratory muscle weakness and exercise limitation. The aim of our study is to describe muscle weakness in AIS patients and its correlation with the curve magnitude.

Materials and methods: Case-control study in with 85 patients with AIS and 25 healthy volunteers. AIS patients were classified into two groups determined by the curve magnitude: A (Cobb angle 25-40°) and B (Cobb angle >40°). Main outcomes were: respiratory muscle strength estimated by maximal inspiratory and expiratory pressures (MIP, MEP), peripheral muscle strength assessed in hands and lower limbs, muscular function tests and exercise capacity. Statistical analysis: chi square test, t-Student and Pearson correlation coefficient.

Results: The skeletal muscle function was decreased in AIS patients in comparison with the controls (p<0.001): MIP (%) 69.4 (SD 5.12) in Group A and 71 (SD 19) in Group B; in the control group MIP was 95 (SD 15); MEP (%) 63.2 (SD 17.9) and 69 (SD 19) for A and B respectively. In the control group was 91 (SD 18). We also decreased strength in lower limbs compared with the controls. There appeared to be no connection between spinal deformity and muscle function.

Conclusions: The patients with AIS show a generalised muscle dysfunction, which contributes to the reduction in their exercise capacity, in absence of a correlation with the magnitude of spinal deformity.

Acknowledgments: Partially funded by grants of Fondo de Investigación Sanitaria (PI 070194), SEPAR, OCAP and CIBERES.

O63
Abstract withdrawn

Scoliosis 2012, 7(Suppl 1)O63

O64
Some possibilities of correction and compensation in body posture regulation among children and youth with low degree scoliosis
J Nowotny1, A Brzék2, O Nowotny-Czupryna1,2, K Czupryna1,2, M Plaszewski1
1Institute of Physiotherapy in Higher School of Administration in Bielsko-Biała, Katowice, Poland; 2Medical University of Silesia in Katowice, Poland.

Scoliosis 2012, 7(Suppl 1)O64

Background: Postural alignments, secondary curves of spine and tendency to unequal body weight distribution are the compensatory mechanisms in scoliosis, eventually leading to disturbances in the regulation of body posture. The pathological pattern of incorrect posture, evokes a vicious circle of causes and effects, which probably includes alterations in body weight distribution to both feet [1-4].

Objective: To examine the role of equal weight loading of both feet in posture regulation among children and adolescents with low-degree scoliosis.

Materials and methods: A total of 115 participants, aged 7-19 years, were divided into three groups: low degree scoliosis (10-26° Cobb; n = 56), scoliotic posture (5-9°; n = 29), and without lateral spine curvature (n = 30). Three measurements of body arrangement and the weight distribution on feet were simultaneously taken using the photogrammetry and the podographic platform: in a free standing position, while attempt to correct body arrangement and with equal loading of both feet.

Results: Unequal weight distribution was observed in free standing position in patients with scoliosis. Attempts to correct body arrangement worsened existing disproportion, especially in the left-side curvatures. Equal foot loading lead to the body disarrangement, even among non-scoliotic subjects.

Conclusions: In subjects with low degree scoliosis the compensatory changes in the spatial arrangement of the body are usually accompanied by asymmetric distribution of foot pressure and the active attempt to correct the curvature enhances this asymmetry. Attempts to maintain symmetrical distribution of body weight result in significant deterioration of the posturometric parameters.

References

O65
Change of the child’s posture after sacroiliac joint manipulation: improved symmetry assessed with the POTSI index
L Stalinski1,2*, T Katwicki1,2
1Rehasport Clinic, Poznan, Poland; 2Sports Secondary School Complex the John Paul II, Skiermience, Poland; 3Scoliosis school, Poznan, Poland; 4Sports Secondary School Complex the John Paul II, Skiermience, Poland.

Scoliosis 2012, 7(Suppl 1)O65

Purpose of the study: To investigate the influence of a single procedure of manipulation of the sacroiliac joints according to Ackermann on the posture of the child, assessed with digital photographs using Posterior Trunk Symmetry Index (POTSI) [1-4].

Background: The use of joint mobilization and manipulation in pediatric patients is a controversial topic due to lack of data respecting Evidence Based Medicine.

Materials and methods: The study group comprised 39 children (17 girls, 22 boys), aged 7.0 to 11.0, mean 8.8 ± 1.1, having the “twisted pelvis” defined as a combination of rotation of one iliac bone and contra-nutation of another iliac bone as well as an apparent shortness of one leg in supine position. The control group comprised 39 children (22 girls, 17 boys), aged 7.0 to 11.0, mean 9.0 ± 1.4. The groups were matched for age, height, weight and BMI. Digital photos of the trunk in standing habitual posture were performed twice: before and after manual therapy comprising single manipulation of the sacroiliac joints according to Ackermann. The control group had no therapy but just a 5-minute rest in sitting position between the two photos.

Results: In the study group POTSI improved significantly from 26.1 ± 12.0 to 16.8 ± 9.5. In the control group POTSI did not change: 21.7 ± 10.3 versus 21.3 ± 11.1.

Conclusions: Single mobilization of the sacroiliac joints by Ackermann method allows for improvement of posture symmetry in children. Photographic assessment of posture using the POTSI index can be used to document it.

References


O66
Self-correction of posture: assessment of the quality of the movement accomplished by non-instructed school children
L Stolinski1,2,3, T Kotwicki
1Rehasport Clinic, Poznan, Poland; 2Sports Secondary School Complex the John Paul II, Skieniewice, Poland; 3Spine Disorders Unit Department of Pediatric Orthopedics and Traumatology, University of Medical Sciences, Poznan, Poland; 4Sports Secondary School Complex the John Paul II, Skieniewice, Poland
Scoliosis 2012, 7(Suppl 1):O66

Purpose of the study: To assess how the movement of self-correction of the posture is accomplished by non-instructed school children.

Background: Postural defects are common in school children and expose them to repetitive claims from the adults to actively correct the posture. Usually the command to “straighten the back” is expressed.

Material and methods: 126 primary school pupils, 60 girls and 66 boys, aged 7.0 to 13.0 years (9±1.6), were examined in standing position twice: in a relaxed posture and in actively corrected posture (after the “straighten the back” command). Children were not instructed what corrected posture means. Spinous processes of C7, Th6, Th12 and S1 were clinically identified. Sagittal clinical angles: C7-Th6 (upper thoracic kyphosis, UTK), Th6-Th12 (lower thoracic kyphosis, LTK), Th12-S1 (lumbar lordosis, LL) and sacral inclination (SI) were measured with Rippstein plurimeter [1-4]. Significance of difference of the means was checked with paired $t$-test.

Results: The UTK, LTK, LL and SI angles in relaxed versus corrected posture were as follows: 32.4±5.3° versus 29.3°±6.8° (difference significant), 6.5°±7.8° versus -2.3°±8.1° (difference extremely significant), 34.8°±7.9° versus 33.6°±8.3° (not significant) and 23.5°±5.9° versus 25.8°±5.5° (difference significant), respectively. Girls and boys followed the similar pattern of changes.

Conclusion: Non-instructed school children straighten their back by introducing pathological lordosis in the lower thoracic spine. Instead, they do pelvic anteversion and only slightly correct upper thoracic kyphosis. Adults' commands correcting posture may be not beneficial for the children.

References:

O67
Co-occurrence of the idiopathic scoliosis and the malocclusion – early results
M Tynakowski1, M Laskowska2, J Czubak, D Olczak-Kowalczyk3
1Department of Orthopaedics, Pediatric Orthopaedics and Traumatology Postgraduate Medical Education Centre in Warsaw, Otwock, Poland; 2Orthodontic Department, Medical University of Warsaw, Poland; 3Department of Pediatric Dentistry, Medical University of Warsaw, Poland
Scoliosis 2012, 7(Suppl 1):O67

Background: Proper timing of the treatment of idiopathic scoliosis seems to be crucial. That is why we tried to look for other abnormalities that may occur more often in children with scoliosis and thus enable earlier establishing the diagnosis of scoliosis.

The aim of the study was to evaluate the co-occurrence of idiopathic scoliosis and malocclusion [1-4].

Materials and methods: Material consisted of 52 consecutive patients with idiopathic scoliosis that visited The Department of Pediatric Orthopedics (out-patients and hospitalized) between February 1st and December 31st 2010. The mean age of the patients was 14 years (8.4 – 18.9). There were 48 girls and 4 boys. All the patients were examined by an orthopaedic surgeon (trunk rotation measured by use of Bunnell’s scoliometer). The diagnosis of scoliosis was based on X-rays. All the patients with non-idiopathic scoliosis were excluded from the research. Next the patients with scoliosis were examined by orthodontic specialist (physical examination and photos).

Results: 51 patients had the malocclusion and only one patient was found with a correct occlusion. There were 23 cases of posterior occlusion, 9 - partially lateral cross bite, and 19 with other anomalies. Among the 52 examined patients only 18 had undergone previous orthodontic treatment.

Conclusions: We present the early results. However, we found higher incidence of malocclusion in the scoliotic patients than in general population. Our results may suggest that all the children and adolescents treated because of malocclusion should be examined by an orthopaedic surgeon. On the other hand scoliotic patients may need orthodontic treatment.

References:

O68
Abstract withdrawn

Scoliosis 2012, 7(Suppl 1):O68

O69
Joint hypermobility syndrome in children with idiopathic scoliosis
D Czaprowski1, T Kotwicki, P Pawłowska, L Stolinski
1Józef Rusiecki University College in Olsztyn, Poland; 2University of Medical Sciences, Poznan, Poland; 3Rehasport Clinic; Sports Secondary School Complex the John Paul II, Skieniewice, Poland
Scoliosis 2012, 7(Suppl 1):O69

Purpose of study: To assess the frequency of occurrence of the hypermobility syndrome (HS) in children and teenagers with idiopathic scoliosis (IS). To assess the presence of HS in relation to the angle of curvature, vertebral rotation, length of scoliosis and the treatment used.

Background: Joint hypermobility syndrome is diagnosed when the mobility of small and large joints is increased in relation to standard mobility for any given age, gender and race, and after excluding systemic diseases [1][2][3]. It is assessed by clinical examination using specific scales (Beighton) [4]. Some methods of physiotherapy used to treat scoliotic children, include exercises that aim at increasing the range of spinal mobility to achieve curve correction [5][6][7][8][9].

Materials and methods: 128 children (92 girls and 36 boys) aged 9 to 18 years, comprising 70 IS children (34 single and 36 double IS), Cobb angle from 11 to 53 degrees, and 58 scoliosis-free controls were examined. Beighton scale as well as Hakim and Grahame questionnaires were used to disclose the presence of HS [1][4][9].

Results: HS was noted more often in children with scoliosis than in the control group (p<0.0001). The angle of curvature, the apical vertebra
Incidence of ligamentous laxity and scoliosis among the population of the United Arab Emirates

K Bagnall, H Al Hamisi, A Al Kaabi, T Al Mazrouee, A D’Souza
UAE University, Al Ain, United Arab Emirates
Scoliosis 2012, 7(Suppl 1):O70

Background: Among a general lack of awareness of scoliosis, the incidence of Adolescent Idiopathic Scoliosis (AIS) in the United Arab Emirates is not known although efforts are currently being made to remedy this. The Emirati people have a unique and well-structured culture with strong family relationships and might be considered a closed community. The suitability and attraction of the population of United Arab Emirates for the study of genetic inheritance in scoliosis and ILE are discussed.

Results: In a population-based study of 294 young people aged 14-18 years, the incidence of AIS was 2.6% (95% CI: 1.4-4.3). The average age at diagnosis was 12.3 years (range: 8-18). The incidence of AIS was significantly higher in females than in males (3.0% vs. 0.7%, p<0.05). The majority of cases (90.5%) were mild (Thoracic Kyphosis: 0°-20°, Lumbar lordosis: 0°-20°). The average severity of AIS was 19° (range: 5°-60°).

Conclusions: The incidence of AIS in the UAE is low compared to other parts of the world. However, the high prevalence of ligamentous laxity among the population suggests a potential genetic predisposition to AIS. Further genetic studies are needed to confirm this hypothesis.

References
Background: Recently, significant advances have been made in understanding the aetiology of adolescent idiopathic scoliosis (AIS) in the area of genetic inheritance. Essential to the success of these studies is the finding of large families with several cases of AIS from which blood samples can be collected and analysed. The emirati culture is unique and encourages large families with many children, often several wives with the same husband, and many cases of consanguinity especially among first cousins. This complex family structure might very well be suited to provide more appropriate examples for the study of genetic heritage in AIS than the more typical western family.

Material and methods: The genealogical history of 15 extended emirati families was collected for 4 generations which would approximate that required for the study of AIS. The number of children in each family and the incidence of consanguinity among first cousins were calculated. These data were compared with similar, published data for western families.

Results: The average number of children per family among the emirati population was 6.29 (often >10), approximately 3x that of the average western family. In each family there were several examples of multiple wives and first cousin marriages. Two families were found in which at least one person had AIS.

Conclusions: These results suggest that the unique, well controlled structure of the emirati families lend themselves to being excellent for extensive study of the genetic inheritance aspects of the aetiology of AIS because of the greater familial component.

O73
The familiarity of idiopathic scoliosis: statistical analysis and clinical considerations
AG Aulisa1, V Guzzanti1, G Mastantuoni1, M Giordano1, A Poggianoni1, L Aulisa2
1Children’s Hospital Bambino Gesù, Rome, Italy, 2“A. Gemelli” Hospital, Università Cattolica del Sacro Cuore, Italy
Scoliosis 2012, 7(Suppl 1):O73

Background: To our knowledge the aetiology of idiopathic scoliosis is still unknown. It is likely caused by the interaction of multiple factors rather than by the action of a single responsible. The fact that idiopathic scoliosis is often seen in members of the same family has led researchers to investigate the role of genetic factors in the aetiology of this disease [1,2].

Purpose of the study: The purpose of this study was to evaluate the impact of the familiarity of idiopathic scoliosis in a selected family sample.

Materials and methods: The authors examined a family sample of 70 female patients with a relationship up to the third generation for a total of 2055 subjects. The parameters studied were: patient’s age at first observation, the type of curve and the mother’s and father’s age at the patient’s birth. The genealogy of the patients was investigated and related to the incidence of the disease.

Results: The outcomes showed that 73% of the patients had an age between 12 and 15 years and that the thoracic localization of the curves was the most frequent. The 60% of the mothers had an age between 20-29 years and 57% of the patients were “first born”. The 5.8% of the brothers and the 12.7% of the sisters were affected by scoliosis. From the analysis of the total sample it is clear that in 53% of the families there is at least another scoliotic besides the patient, while in the remaining 47% she was the only one affected.

Conclusions: The statistical analysis revealed three different types of transmission: multifactorial; autosomic dominant; autosomic recessive. Moreover female sex and firstborn resulted as risk factors of idiopathic scoliosis in the group of patients with multifactorial type of transmission.

References

O74
Study of back trunk asymmetry in children from three ethnic groups and correlation with their handedness
TB Grivas1,2, A Kasartzan1, M Christin1, C Milhas1, C Aaggouris1, G Triantafyllopoulos1, N Dimitrakos1, I Katsoulis1
1Tzanio General Hospital of Piraeus, Piraeus, Greece; 2Orthopaedic Surgeon, Greece
Scoliosis 2012, 7(Suppl 1):O74

Background: Armenian, Albanian and Greek children attending primary and secondary schools in Athens Greece were screened. These three ethnic groups comprise a rather homogeneous genetically population, each of them being culturally a closed social group population. This results in a very interesting group of people from the genetic point of view. The examination and analysis of various anthropometric parameters could reveal and provide useful baseline information for understanding of trunkal asymmetry formation, the preliminary condition of spinal deformity.

Materials and methods: 10863 (5372 males and 5491 females), Greek (n=8918), Albanian (n=683) and Armenian (n=265) children and adolescents (5-17 years old) were screened at their school for back truncal asymmetry or scoliosis. Menarche and handedness (laterality) were also documented. The Prujis scolimeter was used to examine the students in standing and sitting forward bending position. Asymmetries were tested for correlation with laterality. These data were fed in SPSS program spreadsheet and statistically analyzed using STATA** v. 9.0 package.

Results: The mean menarche was found to be 11.79 years of age. There is no statistical difference in asymmetry in pre and post menarche Armenian group girls. In sitting forward bending position (sitFBP), comparison of pre-menarche, showed symmetry differences in only the thoracolumbar (ThL) region among Armenian (46.2%), Albanian (88%) and Greek (80.1%) girls (p=0.030), but not post-menarche. In boys aged 5-10 years, in all sitFBP greater symmetry percentages observed in Armenian compared with Albanian and Greek. In Thoracic (T) p=0.05, Thoracolumbar (ThL)p=0.01, and Lumbar (L) p=0.003).

Comparison of symmetry among girls aged 5-10 years. In all sitFBP greater symmetry percentages in Armenian compared with Albanian and Greek, (in T, ThL and L, p=0.001) were observed. Comparison of symmetry among girls aged 11-17 years reviled difference in right L standing FBP (stdFBP), Armenian 0% asymmetry, Albanian 5.6%, Greek 2.2% respectively (p=0.024), but not for the reared aged boys.

In Armenian group, laterality was correlated with symmetry / asymmetry in L stdFBP, p=0.033. In 11-17 yrs of age Armenian girls, in stdFBP in ThL spine laterality was correlated with asymmetry, p=0.023. In 5-10 yrs old Greek boys correlation between laterality and symmetry - asymmetry in TL spine in sitFBP p=0.015 and stdFBP p=0.049, while in 11-17 yrs old Greek girls, correlation between laterality and symmetry - asymmetry in TL p=0.034 and L p=0.035 spine in stdFBP was found.

Discussion: The above revealed trunkal asymmetry differences indicate a genetic background. The laterality also seems to dictate in some way the formation of these truncal asymmetries.

O75
Controversial Issue Session: Brace treatment in infantile scoliosis: brace treatment problems
FJ Sánchez Pérez-Grueso
Hospital de la Paz, Madrid
Scoliosis 2012, 7(Suppl 1):O75

Orthotic treatment of infantile scoliosis represents a challenge:
1. Most of them are progressive
2. Different etiologies
3. Associated diseases
4. Smaller size anatomy
5. Immature rib cage

Types:
1. Braces
   - Do not provide immediate correction
   - Treatment aimed to “hold” the spine and prevent further progression
   - Risk of chest deformity in case of braces constricting the thorax
Literature does not support the efficacy of braces in the treatment of infantile scoliosis

- Poor compliance (Parents)
- Provide correction. Sometimes scoliosis can be reversed by early treatment with serial corrective plaster jackets in children with mild curves and at an early age (under age two)
- Immature rib cage often deforms before significant correction is transmitted to the spine
- May provoke skin problems
- They may reduce the deformity but not reverse it
- Main goal: surgery as much as possible
- Braces under traction diminish cast complications with the same efficacy in the long term

O76
Controversial Issue Session: Brace treatment in infantile scoliosis: benefits
Jean Claude de Mauroy
Clinique du Parc – Lyon, France
Scoliosis 2012, 7(Suppl 1):O76

Background: The first prospective study of 136 children with progressive infantile scoliosis treated conservatively under the age of four years, and followed up for nine years was published in 2005 by H. Mehta. It shows that infantile scoliosis can be reversed by harnessing the vigorous growth of the infant to early treatment.

Material and methods: In 1965, Cotrel and Morel describing the DFC plaster jacket technique stated that “in young children, it should be feasible not only to prevent further progression but above all to use the child’s growth to regress structural vertebral and thoracic deformities”. Before the child start walking, we use a plaster shell in bending correction. After walking, an underarm plaster cast with a large anterior opening, and the modified Milwaukee brace with polyethylene bars and cervical collar without hyoid support is the only brace that can manage curves in the top part of the spine. It is also the only brace that can avoid a hypoplastic thorax.

Results: Even if IIS has the characteristic that they can be a resolving scoliosis, it must be emphasized that the purpose of the brace is to slow the inevitable progression of the curve, not to correct the curve. The success of conservative orthopaedic treatment depends on two factors:
1. Unlike adolescent idiopathic scoliosis, we have for infantile idiopathic scoliosis (IIS) a prognostic index; the Rib Vertebral Angle Degree (RVAD) as described by M H Mehta is the angle formed on each side between the apical thoracic vertebra and its corresponding rib.
2. IIS are often thoracolumbar curves of large radius, well accessible to bracing.

When conservative treatment is later, the goal of bracing is to allow the child to grow before a more definitive surgical procedure is done. Surgery during growth is complex and faces the technical problems of growing rods without arthrodesis.

Conclusion: It is possible to correct definitively some IIS with an early conservative treatment. The realization of these treatments involving regularly practice of plaster casts may be difficult because of a reduced frequency of infantile scoliosis. It is one of the benefits of conservative treatment, including plaster cast before bracing.

POSTER PRESENTATIONS

P1
Neuropathological approach to conservative treatment of scoliosis- a theoretical view point
K Czupryna1,2, O Nowotny-Zupryna2, J Nowotny2
1Chair of Physiotherapy in Medical University of Silesia in Katowice, Poland;
2Department of Physiotherapy in Higher School of Administration in Bialsk-Biala, Poland
Scoliosis 2012, 7(Suppl 1):P1

Passive keeping the vertical layout is impossible because of the osteoarticular system construction, a high position of COG and the small support area. The correct layout is maintained automatically and is always introduced into the pattern encoded in the CNS. In posture regulation short back muscles play a special role.

At early development of scoliosis CNS automatically corrects irregularities, but over time habituated to them and treats them as something normal. Then we have a habit of incorrect body posture. Any attempt to restore the proper body arrangement is treated as an error and CNS automatically brings an attitude to this abnormal pattern. Later CNS treats it as a defect, which runs the compensatory mechanisms to restore the balance of the body as a whole. Then we have postural alignment, which provides a balance, but does not restore the proper body arrangement.

In the scoliosis treatment it is important to slow progression and prevent the formation of muscle imbalances and to develop the abnormal habit, which are essential part of a vicious circle, even without progressing. Depending on the angle of curvature, observation, corsets and surgical treatment are recommended. A passive observation limits the possibilities of secondary prevention and interfere with the principle of rehabilitation earliness.

In conservative treatment physical therapy methods are treated as unconventional treatment, questioning its effectiveness. There is no evidences that physiotherapy is not good and the sole means of secondary prevention. The biggest problem is transfer the result of correction for automatically adjusted vertical posture [1-8].

References

P2
Different patterns of weight bearing impact sagittal spinal balance
HR Weiss
Orthopedic Rehabilitation Services, Gensingen, Germany
Scoliosis 2012, 7(Suppl 1):P2

Background: A physiologic sagittal alignment of the spine with lumbar lordosis and thoracic kyphosis is the most stable position of the spine, while in patients with Idiopathic Scoliosis (IS) the sagittal profile of the spine is flattened or inverted [1,2]. It has been shown that a correction of the sagittal profile also corrects coronal plane deformity in patients with IS [1]. Therefore sagittal corrections seems to play an important role in the conservative treatment of IS. Within the‘Best Practice’ PT program simple tools are used to correct scoliosis in 3D. One of these tools is the sagittal realignment of the scoliotic pattern of weight bearing. The impact different weight bearing (WB) patterns might have are subject of this investigation.

Materials and methods: 13 healthy subjects (females only, age range from 18 to 45 years) have been investigated with the help of suface topography (Diers® Formetric) in two different patterns of weight bearing (WB forefoot / WB heel). Kyphosis angle, lordosis angle and the inflection point (IP) between the lordotic and the kyphotic curve have been investigated.

Results: There was a significant increase of lordosis angle (49,5° to 51,1°; p = 0,047) in WB forefoot. No change of kyphosis angle has been detected. IP had a tendency to slip more cranially, however this was not significant.

Conclusions: WB on the forefoot increases lordosis angle and by this stabilizes the spine. The different patterns of WB do not seem to change the angle of thoracic kyphosis.
References

P3
Does the use of dynamic elastomeric fabric scoliosis suits provide an improved and more user friendly option for early intervention in childhood scoliosis?
M Matthews1, S Bridges2
1 DIM Orthotics Ltd, Norwich, UK, 2 ‘Ida Darwin Hospital, Cambridge, UK
Scoliosis 2012, 7(Suppl 1):P3

Background: The use of dynamic elastomeric fabric orthoses (DEFOs) for the treatment of neurological scoliosis has become an accepted form of orthotic treatment within many leading centres in the UK. The use of rigid or semi-rigid orthoses in this group have proven to be difficult due to reduced acceptance and discomfort. This paper will discuss the use of DEFOs as a first line of orthotic management to obtain improved long term curve management.

Materials and methods: swChildren’s skin and rigidity of orthosis construction is often contra- indicated due to low muscle activation and mass. The gold standard use of x-rays, Cobb and off centre alignment informs the orthotic options to couple compression, high pressure and void areas. The DEFO design encourages lateral and de-rotative outcomes to be achieved without rigidity [1-5].

Results: A child presenting with Myotonic dystrophy, aged 5 years, and 70° right sided thoracic Cobb coupled with a marked pectus carinatum, represents typical results. The Cobb was reduced to 35°, a year later, coupled with improved spinal balance enabling the child to walk unaided for short distance.

Discussion: The use of DEFO in the treatment of early onset scoliosis can have long term corrective outcomes and appears capable of treating higher Cobb angles. The use of DEFOs could also remove the necessity of continual rigid brace management leading to surgery.

Conclusions: DEFOs could replace rigid and semi-rigid bracing as the preferred treatment modality for children with neurological dysfunction.

References

P4
Case report of an adolescent girl with Kabuki syndrome and kyphoscoliosis, resistant at the conservative orthopedic treatment
MA Taranu1, M Colomer Giralt, V Calderón Padilla, V Pujol Blaya, L Quésada Morán, JM Cavanilles Walker, BM Núñez García, C Rodríguez Monge Hospital Germans Trias i Pujol, Badalona, Spain
Scoliosis 2012, 7(Suppl 1):P4

Background: The Kabuki syndrome (KS) is a rare genetic, hereditary, autosomal dominant, multiple anomaly syndrome, with an estimated incidence around 1/2-1/100 000 worldwide. Not all of the affected individuals have the same malformations.

Five major criteria delineate KS: postnatal short stature, skeletal anomalies, moderate mental retardation, dermatoglyphic anomalies, characteristic facial dysmorphism [1].

Case report: We present the case of a 14 year girl diagnosed of the KS, referred to the Rehabilitation Service for kypho-scoliosis.

References

P5
Brace treatment in an infantile/juvenile patient with progressive scoliosis due to Marfan’s syndrome
HR Weiss1, M Werkmann2
1 Orthopedic Rehabilitation Services, Gensslingen, Germany, 2 Unity Rehabilitation and Orthopedic Surgery
Scoliosis 2012, 7(Suppl 1):P5

Background: Little information exists about successful brace treatment of progressive early onset scoliosis. Even less information is available about the early treatment of scoliosis patients with Marfan’s syndrome at age < 6 years. Purpose of this case report is to demonstrate the possibility of successful brace treatment in a patient with early onset scoliosis due to Marfan’s syndrome [1,2].

Case report: A two year old girl diagnosed with Marfan’s syndrome presented with a double major scoliosis of 20°. After a follow-up of 6 months she showed a rapid progression to 46° (November 2008) and was braced immediately. In-brace correction in the first brace (RSC) was moderate due to the stiffness mainly of the lumbar curve. A new brace was made after significant growth (Gensslingen brace in October 2009). An in-brace correction to 12° thoracic and 12° lumbar has been achieved. In October 2010 she also has outgrown her second brace to some extent. Due to clinical overcorrection (ATR lumbar -5°) brace wearing time has been reduced to 12 hrs./ day at first. In January 2011 at the age of 4 and a half she presented again with an ATR lumbar of -6° and thoracic 2°, lumbar still overcorrected, so we decided to leave off the brace for 3 months time.

Conclusions: (1) Successful brace treatment in infantile / juvenile patients with scoliosis is possible. (2) When treated during periods of rapid growth corrections can be achieved with high correction braces. (3) Before early surgery is performed high quality conservative management seems indicated.

References

P6
Contamination. New developments of a corrective bracing concept resulting from a matching with a different approach
F Tessadri1, M Tavenerato, A Zonta, S Negrii
1 Orthotecnica, Gardolo di Mezzo, Italy
Scoliosis 2012, 7(Suppl 1):P6

Background: The SPOrT (Symmetric, Patient oriented, Rigid, Three-Dimensional) Sforzesco brace has been developed recently and it is continuously in evolution [1].

Purpose: Presentation of two new developments to improve the SPOrT concept coming from the Cheneau concept of bracing.
Materials and methods: The excellent performance of the bottom up action of the SPoRT brace is guaranteed by the drivers, a concept first developed with the Sforzesco brace. Since these cannot be present at the brace’s upper and lower margins, it has been hypothesized that the postural action of the Cheneau concept could be used to obtain an increasing of correction. Two innovations (called “Cheneuization” and “open pelvis”) has been introduced and tested in a series of cases, with progressive improvement and final selection for application [2]. During the presentation we will discuss a range of clinical cases and carried out experiments.

Results: We have introduced two important innovations following one upon the other: the first one relating to the shoulder girdle and the second one relating to the pelvic girdle. In both cases we have obtained a visible translation sustained from the rigidity of the material as well as from the effects of the proper drivers of the SPoRT Brace, according to the aesthetic and appreciably symmetric SPoRT approach. In particular, the “Cheneuization” relating to the shoulder girdle has obtained creditable results in the course of two years of experimentation and has been added to the SPoRT concept. The open pelvis, instead, is still in course of study and development.

References

P7
Infantile idiopathic scoliosis: surgical treatment in rapidly progressive cases
D Lawniczak*, T Kotwicki
Spine Disorders Unit, Department of Pediatric Orthopedics and Traumatology, University of Medical Sciences, Poznan, Poland
Scoliosis 2012, 7(Suppl 1):P7

Purpose: To present 4 cases (5 curves) of infantile scoliosis in children initially managed with corrective brace and physiotherapy. All finally underwent surgical treatment.

Materials and methods: Age of onset was in between 4th and 36th month of life. Initial treatment consisted of physiotherapy and Cheneau corrective bracing in all patients. Duration of conservative treatment was from 4 to 5.5 years. The age at surgery was: from 7 to 12 years (table 1).

Finally patients underwent surgical treatment: anterior and posterior fusion in 2 patients (3 curves), posterior instrumentation (2 growing rods) in one patient, and VEPTR device in one case. All have lead to clinical improvement.

Results: In those cases the curve was rapidly progressing despite our efforts to stop it. As the conservative measures failed, we proceed to surgery for correction and stabilisation of the spine. There were no major complications during surgical treatment.

Conclusions: Conservative treatment plays a vital role in treatment of scoliosis. However, in cases of early onset and rapid progression, surgical treatment appears to be a reliable method.

Table 1(abstract P7)

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age at diagnosis in years</th>
<th>Curve magnitude before treatment Cobb angle</th>
<th>Brace treatment since</th>
<th>Curve magnitude before surgery Cobb angle</th>
<th>Age at surgery</th>
<th>Curve magnitude at last follow up Cobb angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>3</td>
<td>65</td>
<td>5</td>
<td>98</td>
<td>9</td>
<td>55</td>
</tr>
<tr>
<td>2.</td>
<td>3</td>
<td>48</td>
<td>6</td>
<td>78</td>
<td>10</td>
<td>53</td>
</tr>
<tr>
<td>3.</td>
<td>0.5</td>
<td>47</td>
<td>1.5</td>
<td>65</td>
<td>7</td>
<td>40</td>
</tr>
<tr>
<td>Thoracic curve</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Lumbar curve</td>
<td>0.5</td>
<td>44</td>
<td>1.5</td>
<td>56</td>
<td>7</td>
<td>54</td>
</tr>
<tr>
<td>4.</td>
<td>2</td>
<td>55</td>
<td>10</td>
<td>97</td>
<td>12</td>
<td>58</td>
</tr>
</tbody>
</table>
values calculated. The results were compared with similar published data from the United States.

Results: The results showed that the distribution of BMI values was similar to those in the U.S. but that average height and weight values were both significantly lower.

Conclusions: These results suggest that the incidence of AIS in the UAE (when determined) will not be expected to be greater than in other parts of the world due to low levels of BMI. However, normal standards for height and weight in the UAE might need to be adjusted for this specific population in ways similar to some of the Asian countries.

P10
Abstract withdrawn

Scoliosis 2012, 7(Supp 1):P10

P11
Abstract withdrawn

Scoliosis 2012, 7(Supp 1):P11

P12
A comparison of static vs dynamic surface topography measurements in the evaluation of scoliosis

P Knot1, K Smith1, L Mack2, L Peters1, N Patel1, S Thompson2, S Mardjetko2
1 Rosalind Franklin University North Chicago, USA; 2 Illinois Bone and Joint Institute, USA
Scoliosis 2012, 7(Supp 1):P12

The Formetric 4D System (Diers International GmbH, Schlangenbad, Germany) is a surface topography system used to evaluate trunk deformity in patients with scoliosis. The original system took a single static scan of the patient which was subject to variability due to the natural sway of the body during standing. A 4D system was developed that takes multiple scans over 6 seconds and averages them to take into account patient movement during imaging. Averaged scans such as this should show less variability over time than simple images do [1-4].

The purpose of this study was to compare surface topography measurements taken as a single scan with those taken as averaged scans over 6 and 15 seconds to see whether the averaged scans have less variability.

Six volunteer patients without scoliosis were used to measure the position of normal spines in the standing position. Each patient was scanned ten times for each time interval. For each group of scans, a standard error of measurement was calculated. The patients were then compared based on the standard errors for each topography parameter. Data included 6 patients x30 measurements each x10 topography parameters totaling 1800 data points.

Data analysis was done using ANOVA to compare the three groups. There were not significant differences between the groups in any of the surface topography parameters that were studied. Our conclusion was that the population of 6 normal patients, we were not able to demonstrate smaller standard errors of measurement with averaged 4D scans than with single scans.

References

P13
A descriptive study of lateral spondylolisthesis in patients with adult scoliosis

P Knot1, S Thompson2, S Mardjetko2
1 Rosalind Franklin University of Medicine and Science, North Chicago, USA; 2 Illinois Bone and Joint Institute, USA
Scoliosis 2012, 7(Supp 1):P13

Lateral Spondylolisthesis is seen as a consequence of degenerative disc disease. It occurs primarily in the lumbar spine, and is often associated with adult degenerative scoliosis. When it occurs, it can result in severe back pain from disc instability and radicular leg pain from nerve root compression [1-6].

This is a descriptive study of a series of 32 patients with Lateral Lumbar Spondylolisthesis to evaluate the demographics of the population that this occurs in, the symptoms that it causes, and the association that it has with scoliosis.

All patients seen by the authors in a spinal deformity clinic during the calendar year 2010 had their radiographs screened for evidence of lateral Spondylolisthesis. If the 1319 patients screened, this condition was found in 32 patients. They were included if their Spondylolisthesis was greater than 2mm. The cervical, thoracic and lumbar films were screened, but all 32 patients had their lateral spondylolisthesis in the lumbar spine only. They were primarily female (84%) and averaged 63 years of age. The youngest patient seen was 35 years old and had a congenital Klippel-Feil Syndrome and congenital scoliosis in the lumbar spine. The others had primarily adult degenerative scoliosis. There was a high prevalence of osteoporosis (41%). Patients primarily complained of low back pain (94%), but 22% also complained of radicular leg pain. Two patients who did not complain of either leg or back pain both had Down Syndrome. Radiographs showed degenerative scoliosis in all patients, with an average lumbar curve of 50 degrees.

References

P14
Design, implementation and first results of a 3RD generation digital photogrammetric system from trunk surface assessment and scoliosis screening

TB Grivas1, P Patias2, K Soutianis2, E Styliandis2, V Tsoukas2, C Georgiadis2, C Andreou2, P Charalambous2, Y Chrysanthou2
1 “Tzanio” General Hospital of Piraeus, Pirae Brilissia, Greece; 2 “Tzanio” General Hospital of Piraeus, Pirae Brilissia, Greece
Scoliosis 2012, 7(Supp 1):P14

Background: Scoliosis patients typically undergo numerous spinal radiographs and exposed to relatively high doses of ionizing radiation. This has raised concern regarding the effects of this repeated exposure. Additionally assessment of spinal deformities using surface topography of the back is currently considered essential. Digital Photogrammetry can
contribute in non-invasive measurements of the patient’s back and 3D reconstruction of surface shape from digital photos.

**Materials and methods:** The design, technical approaches, involved technologies, software development and instrumentation of an innovative portable system is described. The system is based on a high-resolution digital camera, a range camera and a portable computer. The measurement protocol is highly automated, in order to minimize error sources and maximize user friendliness.

**Results:** The implementation and the first evaluation results of the developed system are presented. The 3D reconstruction of the back’s surface is realized with high accuracy. The system can document the results of conservative or surgical treatment for spinal deformities and will be useful for screening purposes. Spinal deformations indices are derived and clinically tested for evaluation against the Cobb angle radiographic measurements, which are considered the “golden standard” in scoliosis assessment.

**Conclusions:** The quest to elimination of radiation exposure of scoliotic patients gave rise to a number of non-invasive diagnostic techniques. Based on recent technological advances and on a better understanding of medical needs, the system presented, automated to a high degree, produces medically meaningful indices for pre- and post-treatment posterior trunk surface documentation and scoliosis screening. First evaluation results are highly promising.

**References:**

---

**P15**

A comparison of results of SRS-30 questionnaire in scoliosis patients treated surgically or conservatively

H Yilmaz*, T Kuru

1Canakkale Onsekiz Mart University Physical Medicine and Rehabilitation Department, Canakkale, Turkey; 2Physical Therapy and Rehabilitation School, Istanbul, Turkey

Scoliosis 2012, 7(Suppl 1):P15

**Background:** The Scoliosis Research Society Questionnaire (SRS-30) is a specific instrument to measure health-related quality of life in patients with scoliosis who had undergone surgery or had not had. The objectives of this paper are evaluate pain, function, self-image, mental health and satisfaction with management of scoliosis patients and compare of surgical and conservative treatment.

**Materials and methods:** The questionnaire was fulfilled by 80 individuals with scoliosis on the internet and we evaluated their answers. The mean age of the participants at the time they received the questionnaire was 18.6±4.2 years (min:12 years, max:36 years). 35 patients were treated with surgery and 45 were treated with conservative management (brace or/and exercise). 18 individuals were male and 62 individuals were female. Data analysis were performed using SPSS, version 12.

**Results:** There were no differences between pain, function, self-image, mental health and satisfaction with management scores of patients who had surgery or not had (Table 1).

**Conclusions:** The data obtained in this study there were no significant differences in pain, function, self-image, mental health and satisfaction with management scores between the two groups although our study showed that surgery or conservative treatment does not implement successful patient satisfaction.

**Table 1 (abstract P15)**

<table>
<thead>
<tr>
<th>Subgroups</th>
<th>Patients (n=80)</th>
<th>Mean ± SD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pain</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgical treatment (n=35)</td>
<td>4.09±0.78</td>
<td>0.376</td>
<td></td>
</tr>
<tr>
<td>Conservative treatment (n=45)</td>
<td>3.92±0.61</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Function</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgical treatment (n=35)</td>
<td>3.83±0.87</td>
<td>0.433</td>
<td></td>
</tr>
<tr>
<td>Conservative treatment (n=45)</td>
<td>3.99±0.71</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Self-image</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgical treatment (n=35)</td>
<td>3.17±0.81</td>
<td>0.558</td>
<td></td>
</tr>
<tr>
<td>Conservative treatment (n=45)</td>
<td>3.31±0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mental health</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgical treatment (n=35)</td>
<td>3.08±0.98</td>
<td>0.791</td>
<td></td>
</tr>
<tr>
<td>Conservative treatment (n=45)</td>
<td>3.15±0.83</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Satisfaction with management</strong></td>
<td></td>
<td>0.612</td>
<td></td>
</tr>
<tr>
<td>Surgical treatment (n=35)</td>
<td>1.52±0.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conservative treatment (n=45)</td>
<td>1.45±0.55</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**P16**

The effect of the lower instrumented vertebra (LIV) on pain and quality of life in patients surgically treated for an idiopathic scoliosis

J Sanchez-Ray*, J Bago

Hospital Vall d’Hebron, Barcelona, Spain

Scoliosis 2012, 7(Suppl 1):P16

**Purpose:** The objectives of the study are: 1) to measure lumbar spine mobility and analyze the influence of the lower instrumented vertebra (LIV) in patients treated surgically for idiopathic scoliosis, and 2) to determine the correlation between the LIV, lumbar mobility, pain, and quality of life.

**Materials and methods:** 40 patients (36 women, 4 men) were included (mean age 27 years); average time since surgery was 135 months. The mean residual major curve Cobb angle was 35.4°. Lumbar mobility was measured during forward and lateral lumbar flexions using a dual digital inclinometer.

Patients fulfilled the SRS22 Questionnaire and the Quality of Life in Spine Deformities Profile to estimate the perceived sensation of rigidity. Additionally, they rated the pain in the low back area.

**Results:** Lumbar mobility decreased in relation to the LIV. There was no correlation between lumbar range of motion and pain. The LIV does not correlate with the sensation of rigidity. The sensation of rigidity correlated both with SRS22 pain scale and the intensity of low back pain. Health-related quality of life was moderately correlated with the LIV and lumbar mobility.

**Conclusions:** The LIV has an influence on lumbar mobility. The intensity of low back pain is mild in these patients and is not related to the LIV nor to lumbar mobility. The subjective perception of rigidity does not correspond to the loss of lumbar mobility, but rather, is determined by the coexistence of pain. The LIV has a moderate effect on the global quality of life.

---

**P17**

Adolescent idiopathic scoliosis with rapid progression – a case report

M Tyarakowski*, T Kotwicki, J Czubak

1Department of Orthopaedics, Pediatric Orthopaedics and Traumatology of Postgraduate Medical Education Centre in Warsaw, Otwock, Poland; 2Spine...
P19

Reductibility as a prognosis factor of progression in idiopathic scoliosis

Blanca Palomino*, Alicia Villareal, Lorenzo Jiménez, Avelino Ferrero, José Acosta
Hospital Ramón y Cajal, Madrid, Spain
Scoliosis 2012, 7(Suppl 1):P19

Background: Scoliosis is a disease that develops during growth and knowledge of scalability is essential for making treatment decisions. Of the many factors analyzed, are evidence of sex, topography, menarche, age, rapid growth spurt the magnitude of the curve, Risser 0 - 1 and the imbalance of occipital axis-10 mm. The degree of reductibility or flexibility is also seen as a predictor of progression during growth. In this line we have wanted to study whether there is correlation between the initial reduction with cast plaster and outcome in the medium and long term.

Material and methods: This is a retrospective study of 50 patients in the service of Physical Medicine and Rehabilitation of our hospital, which have required orthopedic reduction with a cast and subsequent follow-up corset. Were analyzed for age, sex, topography of the curve, initial angle value, correction after the cast, final angular value, duration.

Results: Of the initial sample in 35° of cases whose initial correction with the cast was less than 10% had a progression more than 6° at final follow-up (8 years), and 65% of the sample progression did not exceed initial angular value on more than 6°. Cases where the cast correction exceeded 10% at follow-up (8 years), 6% exceeded 6, and 94% remained stable compared to the initial angular value, not to exceed 6°.

Conclusions: The initial reductibility factor by treating orthopedic cast, you can be aware of how predictive of long-term outcome.

P20

Auto correction – how to measure the skills acquired during physical therapy sessions

HR Weiss*, S Seibel
Orthopedic Rehabilitation Services, Gensingen, Germany
Scoliosis 2012, 7(Suppl 1):P20

Background: It is common sense that physiotherapy in the treatment of scoliosis patients should improve the skills for active self-correction of the individual patient [1,2]. Although the auto correction (AC) patients can achieve when they use certain high correction exercises obviously can be observed, there is no tool to enable the measurement of this patient skill.

Aim of this study was to test whether AC can be measured with the help of the Scoliometer (ATR) [3].

Materials and methods: 9 Patients with Idiopathic Scoliosis (2 males and 7 females) (IS) with an average Cobb angle of 46° (29 – 64°) and with an average age of 14 (11 – 18) years underwent a five days course of Scoliosis Short Term Rehabilitation (SSTR). ATR (Angle of Trunk Rotation = Scoliometer) measurements were taken before and after the treatment. Additionally, the ability to correct themselves (AC) was measured after four days of treatment.

Results: The ATR was reduced significantly from 10.3° to 8.2° (p < 0.001) after treatment in the nine patients with scoliosis. The ability to correct themselves (AC) as measured with the help of the Scoliometer (ATR 8.2° / ATR 5.7° auto-corrected without additional help by the therapist) was 1.45 and the difference between ATR 8.2° / ATR auto-corrected 5.7° was significant as well (p = 0.0035).

Conclusions: Measurement of auto correction is possible. The relation ATR / ATR autocorr, will usually be 1 (no auto correction possible) at the start of the very first stages of treatment and may increase when the patient gains the necessary exercising skills.

References
P21
Abstract withdrawn

Scoliosis 2012, 7(Suppl 1):P21

P22
Algorithms to prescribe Schroth exercises for each of four Schroth curve types
EM Watkins1, S Bosnjak1, EC Parent2
1University of Alberta, Faculty of Rehabilitation Medicine Edmonton, Canada;
2University of Alberta/Alberta Health Services Edmonton, Canada
Scoliosis 2012, 7(Suppl 1):P22

Background: Systematic reviews have shown that most exercise studies for scoliosis treatment lacked standardization of exercise prescription. Schroth exercise prescription is based on scoliosis curve type with specific exercises designed to target different aspects of the spinal curve and different areas of the body. The intensity of exercises is increased based on patient capacity. There may be dose dependant and exercise specific effects, therefore it is important to adopt a standardized method of prescription, especially in clinical research trials.

Goal: To describe prescription algorithms and a performance checklist for standardizing Schroth exercise treatment based on instructions in the Schroth training.

Materials and methods: Prescription algorithms to guide progression in intensity and from isometric to dynamic exercises were developed by two Schroth-certified therapist-researchers and a physiotherapy professor. Intensity increases by dosage and by exercise type - from gravity assisted postural shifts to active postural shifts against gravity. The performance checklist was developed to ensure adequate exercise performance based on key Schroth principles of breathing and autocorrection.

Results: An exercise prescription algorithm has been designed for each of the four Schroth curve types. The patient begins with the “sitting-on-a-ball” exercise. If performance assessed using the proposed checklist is adequate, the next exercise in the algorithm is attempted. Otherwise, the patient attempts the easier exercise. Adequate performance at start intensity as rated by the checklist, leads to dosage increase to target intensity.

Conclusions: The proposed algorithms and performance checklist will be used to standardize exercise prescription in a randomized control trial.

P23
Abstract withdrawn

Scoliosis 2012, 7(Suppl 1):P23

P24
Scoliosis dance therapy: a worth-while addition to conservative scoliosis treatments? A pilot study evaluating the effect of a DVD led instruction on the wellbeing of scoliosis sufferers
K Bauknecht
Centre for Paediatric Physiotherapy, Neutraubling, Regensburg, Germany
Scoliosis 2012, 7(Suppl 1):P24

Background: Most teenagers with scoliosis suffer from spine deformation and from having to wear a brace. An unfavourable lower sagittal profile of scoliotic vertebrae with a lack of flexibility and a reduced equilibrium is often accompanied by a less developed body feeling. Supporting young people in correcting their posture with conventional treatment can be challenging. The importance of correcting deformities is often most difficult to get across to patients during puberty, resulting in irregular and insufficient exercise patterns.

Aims: A new form of scoliosis treatment, giving up static exercising for a more dynamic, dance-like therapy, has been developed allowing a playful and self determined way of exercising. The objective of this pilot study was to gain a first impression on how this new form of treatment was received by young patients.

Materials and methods: Twenty individuals were given a DVD showing a sequence of about 200 correcting movements to support them with their daily exercises. The effect on various aspects of their lives was subsequently evaluated via a structured questionnaire.

Results: All participants noticed a positive effect on their body awareness and reported improved balance. Exercising took place more frequently and with more enthusiasm. The overall appearance seemed to have improved.

Conclusions: Changing from static to dynamic scoliosis treatment had a positive effect on several factors and improved scoliosis therapy in this small group of patients. A prospective controlled study with a larger sample of patients has to take place before further conclusions can be drawn.

P25
Methods of physical treatment for a post-polio adult with scoliosis
B Torres
Private Practice, Palo Alto, USA
Scoliosis 2012, 7(Suppl 1):P25

Objectives: To describe favorable results in functional postural to enhance and maximize lumbar lordosis at L1/L2 level as well as thoracic kyphosis, increasing the possibility of correcting the postural part of scoliosis in 3D and adding ergonomics.

Case report: A 69 years old female with 85° left thoracic scoliosis and bone fusion surgery at 19 years old at T10/T12 level with onset of pain and disability following menopause. The patient had chronic pains as measured on the Roland and Morris VRS as 4 (very strong).

Methods: The Scoliosis dance therapy e.g. the Schroth dance therapy, has been developed allowing a playful and self determined way of exercising. The objective of this pilot study was to gain a first impression on how this new form of treatment was received by young patients.

Results: The patient is able to maximize corrections, free of pain during standing, walking, exercising for 1/2 hour, sitting and resting on bed using proper ergonomics. Roland and Morris VRS value actually in 0-1 (no pain / little pain).

Conclusions: With thoughtful and reasonable organized physical activities, the patient is able to control her physiological and scoliotic curves, preventing pain, improving the cosmetics, vitality, endurance, functional activities and well being.

References

Cite abstracts in this supplement using the relevant abstract number, e.g.: Torres: Methods of physical treatment for a post-polio adult with scoliosis. Scoliosis 2012, 7(Suppl 1):P25