A blind radiographic controlled study on the efficacy of Active Self-Correction according to SEAS.02

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Introduction

Autocorrection has been considered by SOSORT experts as a key aim of exercises for idiopathic scoliosis, but there is no agreement on how autocorrection should be performed. The Active Self-Correction (ASC) is a kind of autocorrection actively performed by the patient, without any external aid, that forms the base of SEAS.02 (Scientific Exercises Approach to Scoliosis, version 2002). ASC is a selective (i.e. only on the vertebrae involved) lateral de-flexion, sagittal correction (usually increase of kyphosis and preservation of lordosis) and horizontal de-rotation: this movement is very difficult and require some months to be learned. The main difference between ASC and passive autocorrection, the most diffused (to our knowledge the only one existing aside from ASC of SEAS.02), rely in its meaning: ASC aims at teaching a new neuro-motorial behaviour, and consequently a reflex correct posture and counteraction to progression of scoliosis, with high efficacy and efficiency because, being active, it uses the usual neuro-motorial way of learning; ASC is easily applied during everyday activities by trained children without any external involvement (both active – welcome aids – and passive – unwelcome observers). Proprioceptive, esteroceptive and visual aids, as well as some kind of passive autocorrection, are used only in first stages of learning of ASC, but they are readily abandoned in a few weeks, to make it totally active. The aim of this study is to verify radiographically the corrective efficacy of ASC and if it really allow to reach an autocorrection at all.

Material and Methods

27 consecutive patients under treatment that required x-ray examination for their clinical follow-up and that accepted to participate in the study have been included. The average Cobb angle of the proximal and distal curves were 27.5±10.0° and 25.8±10.6° Cobb (°C) respectively, while apical rotation were 7.0±5.5° and 10.9±9.6° Raimondi (°R) respectively. All curves were divided in two groups: ASCG included 35 primary curves (29.4±10.1°C and 11.5±7.6°R) that had been exposed to the action of ASC, while 19 secondary curves (21.6±8.8°C and 4.2±6.4°R) constituted the control group (CONT). All patients performed x-ray exam both standard and in ASC; moreover, they all were photographed frontally and laterally to have an evaluation of the quality of ASC. All exams were performed in the same facility, by the same radiologist, with the same expert PT monitoring the quality of ASC. All radiographs were numbered and measured blindly by three experts in scoliosis treatment (2 MDs, 1 PT): to reduce variability the same protractor was used, and to allow comparison of paired curves the apical and limiting vertebrae of each pair were marked. Curves were considered changed (reduced or worsened) when there was an agreement on this of all examiners. Statistical comparison was performed using t-test and chi-square after verification of normal distribution.

Results

ASCG and CONT were statistically different for °C and °R at baseline ($P<0.05$). ASCG had better results than CONT for °C average absolute (3.0±3.3° vs. 0.8±3.4° - $P<0.05$) and percentage reduction (11.0±12.3% vs. 2.6±15.1% - $P<0.05$) as well as °R reduction (-2.0±4.2° vs. +0.7±2.7° - $P<0.05$), while the percentage of °R reduction showed only a tendency to significance (13.2±63.4% vs. 23.1±88.9% - $P<0.1$). In the ASCG 26 curves (74.3%) were reduced of 4.5±2.7°C, while 2 (5.7%) worsened 3.7±1.9°C, and 7 (20%) did not change: this was different from CONT (8 better, 10 unchaged, 1 worsened - $P<0.05$). On the horizontal plane, in the ASCG 17 curves (48.6%) were

reduced of 5.1±3.8°R, 15 (42.9%) did not change and 3 (8.6%) worsened of 4.8±3.6°R, with a difference from CONT (8 improved, 10 unchanged, 1 worsened - $P<0.05$). There was no correlation between degree of curvature and correction obtained through ASC ($r = 0.0008$). Moreover, there were no statistically significant differences according to time of follow-up since last learning session, even if all patients with worsened curves had their follow-up at least 60 days before ($P<0.05$). Decrease of °R was associated with that of °C (16/17), while this was not true for worsening (1/3). Only 1 curve in the ASCG worsened in both °R and °C, while only 2 patients did not improve in at least 1 parameter.

Discussion and Conclusion

ASC does allow an autocorrection. This study proves that it is possible to reduce actively the curvature with a selective action, without any external aid, and that expert PTs can teach ASC: the fact that some curves worsen require more consideration, anyway. According to the difference at start between ASCG and CONT, whose curves were of lower importance and not structured, there should have had better results in CONT if the action of ASC would have been undistinguished and generalized. Results were better in terms of °C, and ASC in the future should be better focused on rotation too. In this study we did not perform any lateral radiograph, because of the increase exposure to x-rays, and in this way it was not possible to have any data on the sagittal results of ASC, even if this plane is clearly focused during exercises: this should be considered in future studies. To our knowledge there are no studies focused on autocorrection, both passive and active: ASC could have a lower correction than passive autocorrection, but this should be demonstrated, and most of all final results of both methods should be compared in terms of cost/benefits (both economical, psychological and personal). The results of this study do not necessarily mean that in the long term there is a positive outcome of SAES.02 treatment that is based on ASC: this should be demonstrated with other methods.