عنوان مقاله:

Prediction of Post-operative Clinical Indices in Scoliosis Correction Surgery Using an Adaptive Neuro-fuzzy Interface System

محل انتشار:

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نویسندگان:

Rasoul Abedi - *Department of Biomedical Engineering, Amirkabir University of Technology, Tehran, Iran*

Nasser Fatouraee - *Department of Biomedical Engineering, Amirkabir University of Technology, Tehran, Iran*

Mahdi Bostanshirin - *Department of Biomedical Engineering, Amirkabir University of Technology, Tehran, Iran*

Navid Arjmand - *Department of Mechanical Engineering, Sharif University of Technology, Tehran, Iran*

hasan ghandhari - *Bone and Joint Reconstruction Research Center, Shafa Orthopedic Teaching Hospital, Iran University of Medical Sciences, Iran*

خلاصه مقاله:

Objectives: Accurate estimation of post-operative clinical parameters in scoliosis correction surgery is crucial. Different studies have been carried out to investigate scoliosis surgery results, which were costly, time-consuming, and with limited application. This study aims to estimate post-operative main thoracic cobb and thoracic kyphosis angles in adolescent idiopathic scoliosis patients using an adaptive neuro-fuzzy interface system. Methods: Distinct pre-operative clinical indices of fifty-five patients (e.g., thoracic cobb, kyphosis, lordosis, and pelvic incidence) were taken as the inputs of the adaptive neuro-fuzzy interface system in four categorized groups, and post-operative thoracic cobb and kyphosis angles were taken as the outputs. To evaluate the robustness of this adaptive system, the predicted values of post-operative angles were compared with the measured indices after the surgery by calculating the root mean square errors and clinical corrective deviation indices, including the relative deviation of post-operative angle prediction from the actual angle after the surgery.Results: The group with inputs for main thoracic cobb, pelvic incidence, thoracic kyphosis, and T۱ spinopelvic inclination angles had the lowest root mean square error among the four groups. The error values were ۳.۰° and ۶.۳° for the post-operative cobb and thoracic kyphosis angles, respectively. Moreover, the values of clinical corrective deviation indices were calculated for four sample cases, including ۰.۰۰۸۶ and ۰.۰۶۴۱ for the cobb angles of two cases and ۰.۰۵۳۴ and ۰.۲۸۷۹ for thoracic kyphosis of the other two cases.Conclusion: In all scoliotic cases, the post-operative cobb angles were lesser than the pre-operative ones; however, the post-operative thoracic kyphosis might be lesser or higher than the pre-operative ones. Therefore, the cobb angle correction is in a more regular pattern and is more straightforward to predict cobb angles. Consequently, their root-mean-squared errors become lesser values than thoracic kyphosis. Level of evidence: IV

کلمات کلیدی:

Cobb angle, Pelvic incidence, posterior surgery, spine, thoracic kyphosis