

Torso Surface Indices Describing the Rib Cage deformity in Scoliosis

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Introduction: Scoliosis is a complex three dimensional deformity of the spine, in which trunk rotates and shifts abnormally. 3% of adolescents have Scoliosis. Conventional assessment methods which include several Xrays taken from the back, of the patient, have several disadvantages. High radiation exposure and presenting an insufficient 2 dimensional model are the main drawbacks. Over the past 4 decades, alternative non-invasive imaging systems have been developed and used for monitoring scoliosis.

In this regard, the Edmonton Scoliosis Group has recently obtained a 4 camera system to acquire full 360 degree views of the trunk. A new set of surface indices have been defined to describe the malformation in the ribcage of Scoliotic patients.

Objective: New surface features have been used to model the trunk malformation and describe the spinal deformity.

Methodology: A Matlab GUI has been used to run the analysis. After the acquisition, torso is divided into 18 cross-sections (each represents a vertebrae level C7-L5). Seven, three dimensional surface features, are calculated for each cross section. For each acquisition the mean and the range for each surface feature is reported. Moreover, to model the rib cage, eight more indices are measured and reported along the surface features.

Results: In this preliminary analysis, 10 Scans of normal kids (10-18 years) are used. For each scan, 22 features have been measured. To test the reliability of these measurements, each scan was analyzed 4 times.

Highest standard deviation is 8.5 mm for the distance measurements and 8 degrees for the angle measurements.