Adolescent idiopathic scoliosis (AIS) is the most common abnormal deformation of spine, a condition that is more common in females. Frequent follow-ups are crucial as it progresses rapidly during the adolescent growth period. The conventional scoliosis monitoring using the Cobb Angle has critical limitations recognized in the literature including the 2D measurements from the posterior-anterior radiographs, and growing concern regarding the excessive X-ray radiation exposure, with their associated risk of developing cancers.

Surface topography (ST) is a noninvasive method for scanning the torso surface in order to assess cosmetic deformities. Most ST methods use landmarks placement on anatomical locations of torso to measure the ST indices [1-4]. The ST indices are used to predict spine characteristics from torso shape with to avoid unnecessary radiographs in follow-up visits and decrease radiation dose and associated risk of cancer. Despite the advancement of ST methods, it remained as the secondary tool in the management of scoliosis, because it is subject to validation with the radiograph measurements. Nevertheless, application of ST in scoliosis management reduced the radiation dose which is a significant contribution to the management of scoliosis.

Human errors in markers placement, and 2D measurements nature of resulted indices limited the reliability of the marker-based ST methods. In contrast, I developed a novel markerless ST asymmetry analysis approach, which considers the full torso geometry and is independent of human interactions [5]. This method is compatible with any data acquisition system in scoliosis clinics that scans the 3D geometry of the torso in normal posture. The novelty of the developed ST method is on an asymmetry analysis of full torso which visualizes the deformed areas of torso affected by AIS curve using contour maps [5-7]. Some ST parameters, such as maximum deviation, were used to predict the severity of spine curve at each visit. The underlying motivation was the fact that, more frequent follow-up visits could be considered to detect scoliosis curve progression in early stages without increasing the risk of cancer which was the main concern of radiography. If the ST identified a curve progression for a patient, a full vertebra radiograph scan is required regardless of its location and severity. But, if curve progression was not predicted, taking radiograph in the follow up visit can be avoided. The overall accuracy of the ST analysis in classifying curve severity was 70%, only 11% of progressed curves were miss classified.

Citation: Amin Komeili, “3D Markerless Surface Topography Analysis of Scoliosis Patients”. EC Orthopaedics ECO.02 (2019): 09-10.
The ST methods showed promising results in identifying scoliosis curves with progression in the follow-up visits. However, there are some challenges in ST analysis of scoliosis patients that requires further investigations such as the need for manual data processing, marker placement, and low correlation between the ST parameters and the spine curve for overweight patients.

**ACKNOWLEDGEMENTS**

The authors gratefully acknowledge Dr. S. Adeeb, Dr. E. Parent, Dr. M. El-Rich (University of Alberta) for their input and valuable guidance in this work.

**BIBLIOGRAPHY**


©All rights reserved by Amin Komeili.