CHANGES IN ADOLESCENT INTERVERTEBRAL DISCS, END PLATES AND BONE MARROW OF LUMBAR SPINE IN IDIOPATHIC THORACIC SCOLIOSIS

AN MRI BASED STUDY

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Abstrak

Cakera tulang belakang mula mengalami proses 'degenerasi' seawal dekad yang pertama lagi. Bagi pesakit skoliosis remaja, tulang belakang bahagian toraks yang bengkok memberikan tekanan yang tinggi kepada cakera di bahagian 'lumbar'. Secara teori, ini akan mengakibatkan perubahan lebih awal kepada proses 'degenerasi' cakera, perubahan Modic dan nodul Schmorl. Sebelum ujian imbasan gelombang magnet (MRI) dicipta, tiada kaedah dapat digunakan untuk mengkaji cakera tulang belakang, sum-sum tulang dan nodul Schmorl's. Pemeriksaan ini kini dapat dijalankan dengan tepat dan terperinci dengan bantuan MRI.

Kajian secara merentas kumpulan ini bertujuan mengkaji cakera tulang belakang, perubahan 'Modic','Schmorl's nodes' dan keadaan sum-sum tulang belakang pada pesakit skoliosis toraks remaja. Imej MRI dari 40 orang pesakit merangkumi 200 cakera tulang belakang telah dipilih untuk kajian sepanjang tempoh 6 bulan. Purata umur pesakit ialah 15.5 ± 2.7 tahun (julat dari 10 hingga 20). Purata sudut Cobb's ialah 47.63° ± 14.1° (julat dari 20° hingga 80°). Pesakit adalah mereka yang menerima rawatan di klinik tulang belakang, Jabatan Ortopedik, Hospital Universiti Sains Malaysia dan telah dirujuk untuk menjalani pemeriksaan MRI. Imej MRI telah diperolehi dari pengkalan data radiologi yang terdapat di universiti ini dan telah dianalisa oleh seorang pakar radiologi. Sudut Cobb's pada bahagian toraks telah dikira menggunakan gambar radiologi tulang belakang pesakit. Maklumat mengenai jantina dan umur pesakit telah diperolehi dari rekod perubatan pesakit. Keputusan kajian menunjukkan semua cakera tulang belakang pada bahagian 'lumbar' mengalami proses degenerasi dan kebanyakannya di tahap gred 2 dan 3 pada sistem klasifikasi 'Pfirrmann'. Tiada cakera yang digredkan sebagai normal

(Pfirrmann 1). Perubahan 'Modic'(15%) dan nodul 'Schmorl's(5%) jarang dapat dilihat pada bahagian 'lumbar'. Tahap bengkok tulang belakang juga tidak dapat dibuktikan mempengaruhi tahap 'degenerasi' cakera tulang belakang, perubahan 'Modic' dan nodul 'Schmorl's'.(nilai $p > 0.05$)

Kesimpulan dapat dibuat bahawa semua cakera tulang belakang bahagian 'lumbar' pada pesakit skoliosis remaja bahagian toraks mengalami proses 'degenerasi'. Tahap 'degenerasi' cakera tulang belakang juga tidak mempunyai kaitan yang jelas dengan tahap bengkok tulang belakang toraks.

Kata kunci: skoliosis remaja; cakera tulang belakang; perubahan 'Modic'; 'Schmorl's nodes'; tulang belakang toraks bengkok

Abstract.

Intervertebral disc degeneration is known to occur as early as the first decade in normal individuals. In adolescent idiopathic thoracic scoliosis, the spinal curvature is thought to impart mechanical stresses on the lumbar spine. This in theory would lead to early degenerative discs changes, Modic changes and Schmorl's nodes as part of the whole degenerative process. Before the advent of magnetic resonance imaging (MRI), proper assessment of the discs, end plates, vertebral bone marrow changes and Schmorl's nodes were not possible. With the help of MRI, a more detailed and accurate assessment of the intervertebral disc and vertebral bone marrow is now possible.

This was a cross sectional study with the aim to identify and grade lumbar intervertebral discs, end plates, bone marrow changes and Schmorl's nodes in adolescent idiopathic thoracic scoliosis patients. Lumbar MRI films from 40 patients totaling 200 discs were recruited into this study during 6 month period. The patients' ages were 15.5 ± 2.7 years old (range 10 to 20). The Cobb's angles average were 47.63° ± 14.1° (range 20° to 80°). The patients were those attending Spine clinic, Hospital Universiti Sains Malaysia and diagnosed with idiopathic thoracic scoliosis. MRI were ordered for them mainly due to complaints of back pain, neurological deficit and others. MRI films were obtained from the online database system and analyzed by a radiologist, looking for the changes mentioned before. Thoracic scoliosis Cobb's angles were measured from patient's AP(anteroposterior) radiological film of the spine. Demographic data regarding sex and age were obtained from the patients' medical records. Our results showed that in adolescent idiopathic thoracic scoliosis patients, all lumbar discs were affected by degenerative changes mainly grade 2 and 3 in Pfirrmann classification system. No disc

was graded as normal (Pfirrmann 1). Modic changes(15%) and Schmorl's nodes(5%) are not commonly found in the lumbar discs of idiopathic thoracic scoliosis. The severity of thoracic spinal curvature was not proven to affect grades (Pfirrmann) of degenerative disc changes, Modic changes and Schmorls nodes. (all p value >0.05)

We concluded that lumbar discs in adolescent idiopathic scoliosis with a single thoracic curve are all affected by degenerative changes. The thoracic curvature was not proven to have a direct effect on the severity of disc changes, Modic changes and Schmorl's nodes.

Keyword: idiopathic scoliosis; intervertebral discs; Modic changes; Schmorl's nodes; thoracic curvature