Stenosis Versus Ischemia of the Spinal Canal – Contact Endoscopy Blood Flow Patterns

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Introduction

Absolute Stenosis of the spinal canal – the most common condition in the spinal surgery practice – implicates concentric, full circle narrowing of the cross sectional profile of the spinal canal. (Fig 01)

There are different postulates aims on explanation of the underlying mechanism of neurogenic claudication associated with lumbar spinal stenosis including compression or ischemia of the nerve roots. Contact endoscope is capable of visualizing red blood cells dynamics in the blood vessels.(Fig 02)

The method provides objective measurement of the microcirculation in the scanned region. Tha aim of the study was the assessment of the changes in the flow rate in the dural blood vessels in spinal lumbar stenosis before and after surgical decompression.(Fig 03) (Fig 04)(Fig 05)

Methods

The group of 9 patients aged 40 – 65 years underwent decompression for multilevel lumbar spinal stenosis with the measurement of the microhemodynamics of the dural vessels using contact endoscope. The images were taken before and after decompression and the microhemodynamics changes observed were matched. The erythrocyte dynamics was graded into three patterns: A: no movement B: pulsatile movement C: continuous movement (Video 6, 7, 8)

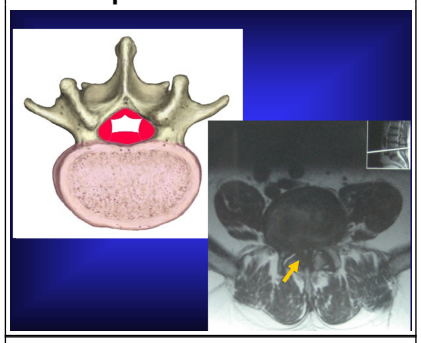
Results

Assessment of intravascular erythrocyte flow rate before decompression revealed decreased flow in all patients consistent with flow pattern A and/or B. After decompression was completed, the flow rate was significantly increased and showed continuous erythrocyte flow. (Video 09)

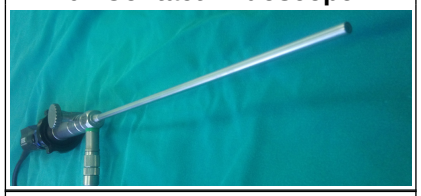
Conclusions

Our results revealed decreased dural vessels microhemodynamics in lumbar spinal stenosis. Contrary to the atherosclerosis that results in the internal obliteration of the blood vessels – the stenosis of the spinal canal space results in external compression i.e. obliteration of the blood vessels in stenotic canal area.

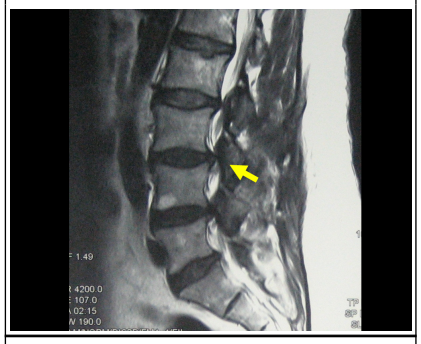
01. Spinal Canal Stenosis



02 Contact Endoscope

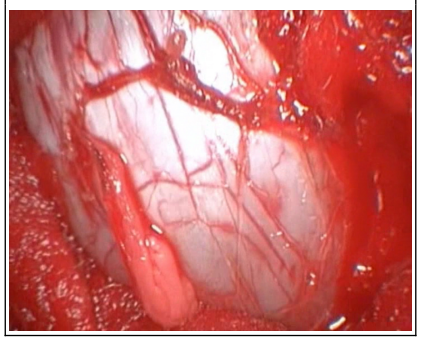


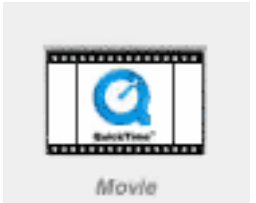
03. Blood Flow Measurement Point



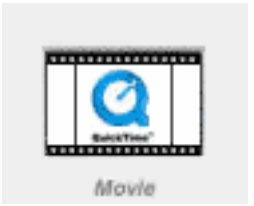
04. Interlaminar Opening for the Endoscopic Dural Vessels Scaning

05. The Dural Vessels Network

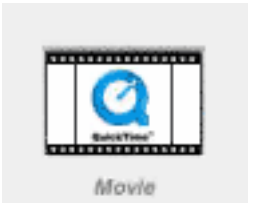


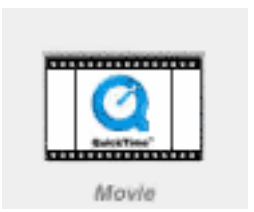


06. Erytrocyte Dynamics - No Movement



07. Erytrocyte Dynamics - Pulsatile Movement





08. Erytrocyte Dynamics Continuous Slow Movement