Intraoperative Evaluation of the Effect of Various Medications on the Microcirculation of the Nerve Root in Patients With Degenerative Disk Disease

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Weak point of radicular nerve:
1. Absence of dura mater;
2. Thin epineurium;
3. No CSF;
4. High mobility of nerve root;
5. Closeness to bone structures (enclosed space)
Regulatory factors of nerve root microcirculation:

- Endothelial
- Neurogenic
- Myogenic
- Respiratory
- Cardiac (sphygmic)

Active factors

Passive factors
PURPOSE

Qualitative and quantitative evaluation of different medications that take action on intraradicular microcirculation before and after surgical discectomy in sciatica patients.

Materials and methods:
- 87 patients (41 – ♀, 46 - ♂);
- Age 24-68 y.o.

Inclusion criteria:
- Patients with lumbar disc herniated;
- Sciatica (radicular pain)

Exclusion criteria:
- Patients with SSS (spinal stenosis syndrome);
- History of sciatica more than 6 months;
- Ischemic heart disease, hypertension, cerebral infarction, arterial sclerotic diseases, and anemia (hemoglobin level, <11 g/dL). Patients with a history of steroid use also were excluded. The use of nonsteroidal antiinflammatory drugs had been discontinued 1 week prior to surgery. The lumbar spine operation was the first for each subject.
Laser Doppler Flowmetry (LDF)
- I group (control) – 56 people
  Intraoperative measurement of LDF without medications injected before and after discectomy

- II group – 31 people:
  Intravenous injection of medications before decompression followed by measurement of LDF
  
  II E (Euphyllin 2,4% 10 ml ) n=14
  II D (Dexamethasone 0,4% 1 ml) n=11
  II R (Middle molecular dextrane (Rheopolyglucin)) n=6
Results:

Вейвлет-анализ

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<th>Диапазон частот</th>
<th>Э 0.0095 - 0.02</th>
<th>Н 0.02 - 0.06</th>
<th>М 0.06 - 0.2</th>
<th>Д 0.2 - 0.6</th>
<th>С 0.6 - 1.6</th>
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<td>Γмакс</td>
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<td>(Амакс/3с) *100%</td>
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НТ = 6.54

MT = 11.19

Вейвлет-анализ

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<th>Д 0.2 - 0.6</th>
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НТ = 5.51

MT = 5.78
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M – microcirculation rate (perfusion units)
σ – mean level oscillations
Kv – regulatory tension

E – endothelial regulatory factor
N – neurogenic factor
M – myogenic factor
R – respiratory factor
C – cardiac factor
RESULTS

CONCLUSIONS

- LDF method allows to evaluate the total level of nerve root microcirculation either with quantitative analysis of regulation of microcirculation.

- All the investigated medications showed their intraoperative effectiveness on MR. The most effective medication increasing MR was the group of middle molecular dextrane – rheopolyglucin.
DISCLOSURE

None of the authors has any potential conflict of interest