

J-H. LIN, M. PENG, P-C. LIN, C-C. WU, Y-H. CHIANG. **Decreased CSF area in spinal canal is highly correlated with risk of neurogenic intermittent claudication but not SF-36 or pain.**

Gerontechnology 2016;15(suppl):154s; doi:10.4017/gt.2016.15.s.736.00 **Background** A major symptom in lumbar central canal stenosis (LCCS) is neurogenic intermittent claudication (NIC)¹. The level of LCCS responsible for NIC is generally estimated from subjective symptoms and objective findings, and then determined by various diagnostic imaging modalities such as magnetic resonance imaging (MRI). The absence or decrease of cerebrospinal fluid (CSF) within the spinal canal has been proposed as one of the causes of NIC². The absence or decrease of CSF has been used to determine the pathological level at which a surgeon should operate. However, it is still unknown at which level of CSF decrease NIC appears.

Objective To establish a relationship between the CSF area within the spinal canal and the risk of NIC. **Methods** 30 consecutive patients with degenerative lumbar spinal stenosis or degenerative disc disease who were scheduled for elective surgery were enrolled. All patients underwent preoperative MRI and completed a self-assessment quality of life questionnaire (SF-36³). CSF area was calculated on T1- and T2-weighted axial MRI with a published algorithm⁴. NIC was diagnosed if the patients had (i) disability to walk for a certain distance due to radicular symptoms on bilateral legs, and (ii) The radicular symptoms can be relieved by sitting or squatting, and (iii) no evidence of peripheral vascular diseases on the legs. The Visual Analog Scale (VAS) of back or leg pain and patient characteristics were recorded by reviewing the charts of the patients. Statistical analysis of the data was performed to seek a relationship between CSF area and quality of life as recorded by SF-36, or the risk of NIC, or the VAS of back or leg pain. **Results** The patients: 17 females, 13 males; average age: 58.9±12.6 yrs. CSF area was neither correlated with VAS of back or leg pain ($p=0.23, 0.25$, respectively), nor all facets of SF-36 ($p>0.05$). CSF area was less in patients with intermittent claudication (0.67 ± 0.13 versus $0.085\pm 0.027\text{cm}^2$, $p<0.0001$, *Figure 1*). The risk of NIC were 100% when CSF area was less than 0.1cm^2 , 60% when between 0.1 to 0.5cm^2 , and 0% when more than 0.5cm^2 (*Figure 2*). **Conclusion** Based on the results, decreased CSF area in spinal canal is highly correlated with risk of neurogenic intermittent claudication but not SF-36 or pain.

References

1. Tanishima S, Fukada S, Ishii H, Dokai T, Morio Y, Nagashima H. Comparison between walking test and treadmill test for intermittent claudication associated with lumbar spinal canal stenosis. *European Spine Journal* 2015;24(2):327-332; doi:10.1007/s00586-014-3511-8
2. Kobayashi S, Suzuki Y, Meir A, Al-Khudairi N, Nakane T, Hayakawa K. Circulatory dynamics of the cauda equina in lumbar canal stenosis using dynamic contrast-enhanced magnetic resonance imaging. *The Spine Journal* 2015;15(10):2132-2141; doi:10.1016/j.spinee.2015.05.014.
3. Guilfoyle MR, Seeley H, Laing RJ. The Short Form 36 health survey in spine disease--validation against condition-specific measures. *British Journal of Neurosurgery* 2009;23(4):401-405; doi:10.1080/02688690902730731.
4. Wu CC, Huang GS, Chen YL, Chiang YH, Lin JH. Unsupervised Classification of Cross-section Area of Spinal Canal. 2013 IEEE International Conference on Systems, Man, and Cybernetics; 2013; doi:10.1109/SMC.2013.646

Keywords: cerebrospinal fluid, lumbar spinal stenosis, intermittent claudication

Address: Taipei Medical University Hospital, Taipei, Taiwan; E: jianner@me.com

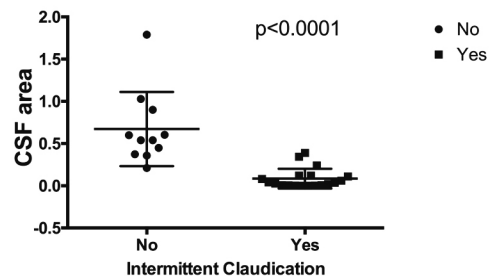


Figure 1. CSF (cerebrospinal fluid) area was significantly less in patients with intermittent claudication

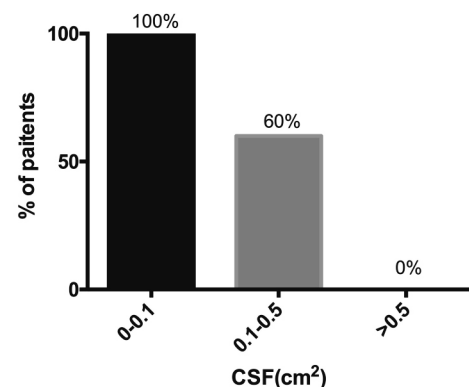


Figure 2. CSF (cerebrospinal fluid) area was highly correlated to the risk of intermittent claudication