

## Japanese Acupuncture - Current Research

### *Current Acupuncture Treatment for Acquired Lumbar Canal Stenosis in Japan*

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#### 1. Introduction

Spinal canal stenosis can be caused by hypertrophy of the vertebra forming the spinal canal themselves or the ligamenta flava, by protrusion of intervertebral discs etc. and thus lead to compression of the cauda equina or spinal nerve roots encased within the spinal canal, producing compression symptoms of these nerve structures. Acquired lumbar canal stenosis (LCS) is characterized by neurogenic intermittent claudication and morbidity types divided into an external form marked by pain and numbness of the affected leg and weakness (nerve root type) and a bilateral internal form, in which the patients complain in addition to the symptoms of the lower extremity, bladder and similar symptoms (cauda equina type).

The anteroposterior diameter of the spinal canal of the Japanese is narrower than that of white and colored persons, so that this is one of the frequently encountered diseases among the Japanese. Moreover, with the advancing age of the Japanese population, the number of patients with this condition is expected to increase still further. Thus, elucidation of its pathology and development of effective therapies are tasks that await solution in Japan. Therapeutically, the surgical procedure of posterior decompression permits alleviation of the symptoms in many patients, but long-term postsurgical observation has revealed that relief is reportedly not long-lasting. In the elderly, concomitant presence of vascular diseases often increases the risk of surgery. Improvement of surgery results and development of effective and safe conservative therapy for LCS are pressing issues at hand and attempts have been made to use acupuncture and moxibustion treatment for this purpose.

During the 2 years from April 1992 to March 1994,

the chief complaint of 841 (40.2%) of the 2,093 patients who visited the Department of Acupuncture and Moxibustion at the Tsukuba College of Technology Clinic (TCT-Clinic) was low back pain. Among these patients 15 (0.7%) suffered from LCS. This shows that LCS is a condition often seen among patients undergoing acupuncture and moxibustion treatment in Japan. Although a number of research papers have been published in Japanese, a search for acupuncture treatment of LCS on "Medline" or the representative database for EBM, "The Cochrane Library", gives almost no hits. In the Japanese medical reference database "Igaku Chuo Zasshi (Japania Centra Revuo Medicina) "web version" a total of 27 Japanese papers can be found. Among these 15 references are case reports. There is only one randomized controlled clinical trial pertaining to neurogenic intermittent claudication, so that the current evidence for the acupuncture treatment of LCS rests almost entirely on the information gathered through case series studies. Below we would like to introduce the clinical picture of acupuncture treatment for LCS in Japan based on the representative literature.

#### 2. Representative clinical reports

##### 1) Fujinuki, R. 1989-90

Mr. Fujinuki is a practicing acupuncturist and has reported about the treatment of LCS in his acupuncture clinic from a western medical point of view. Practicing acupuncturists in Japan are at a disadvantage regarding the western medical evaluation of the pathology of this condition because they cannot use any accessory diagnostic procedures. Yet, most of Fujinuki's patients who opted for acupuncture and moxibustion treatment had already been diagnosed and undergone appropriate treatment at mainstream medical facilities. Previous diagnoses could be referred to and specialized physicians consulted, which clinically compensated for these problems.

Examination of 28 patients (15 men and 13 women; age range 46 to 80 years) in whom a cauda equina

intermittent claudication was suspected based on the anamnesis and physical examination, showed that almost all of these patients had already consulted an orthopedist. The claudication distance ranged from 13 to 310 m (average 102 m) and only a few patients presented obvious bladder or rectal symptoms.

The treatment consisted of 2-3 treatment sessions per week during which electroacupuncture was performed in the vicinity of the intervertebral joints surmised to be responsible for the symptoms appearing when walking. Tender points in the buttocks and legs were also needed.

Based on the Takayama Medical and Pharmaceutical University score, the evaluation results showed in 7 patients a ratio of more than 75% improvement, in 6 patients a ratio of 50-74%, in 2 patients a ratio of 25-49%, in 11 patients a ratio below 25% and 2 patients dropped out of the study. Breakdown of LCS type showed that the improvement ratio was highest in patients with the monoradicular type (69.7%). When classified by symptoms, the study showed that there was some improvement in the low back and leg pain as well as the claudication, but effectiveness for numbness, feeling of coldness or weakness was not less pronounced. Pain as the predominant symptom of the monoradicular type was comparatively well relieved regardless of the claudication distance. However, according to recommendation by Fujinuki, for patients who have had a long history and clear neurologic disturbance, the limit of this treatment should be identified early and the patient be referred to the relevant specialists for consultation.

Moreover, Fujinuki also reported a randomized comparative clinical trial performed in order to evaluate the appropriateness of the acupuncture treatment for LCS<sup>3)</sup>. In this trial, the 23 patients with LCS were randomly assigned into an electroacupuncture treatment group inserting the needles toward the intervertebral joints as well as a single insertion group (the needle is inserted and removed immediately). A comparison of the

claudication distance prolongation before and after each treatment showed for the electroacupuncture group, an average value of 136% and for the single insertion group a ratio of 7%, thus representing a significantly better improvement in the former.

## 2) Kasuya, D. 1989-99

Mr. Kasuya is an acupuncturist employed in a university hospital, and like Fujinuki, conducts western medically orientated clinical research. Using the functions of a university hospital, he performed research to more accurately identify the pathology. He used thermography for an objective evaluation of the clinical results.

A total of 62 patients with LCS (36 men and 26 women, age range from 22 to 83 years, average age: 67 years) with LCS presenting a chief complaint of intermittent claudication. Diagnosis rested on the findings of diagnostic imaging. A breakdown into clinical types showed 27 patients with radicular type, 5 patients with cauda equina type, and 30 patients with a mixed type.

The vicinity of the lumbar intervertebral joints or intervertebral foramina served as insertion points for the treatment. The needles were either retained (inserted needles are removed after a short retention period) for about 15 minutes, or else electroacupuncture or the thrusting and lifting technique (inserted needles are manipulated vertically to apply mechanical stimulation) were applied. Patients were treated at a rate of one session per week and the results evaluated 3 months after treatment began.

Among the 62 patients, excellent results were observed in 14 patients, the treatment was effective in 17 patients, slightly effective in 19 patients and ineffective in 12 patients. The evaluation criteria for the results of back pain profile recommended by the Japanese Orthopaedic Association (JOA score) showed a marked improvement in the subjective symptoms and movements within the activities of daily living in patients with the radicular type, but no significant

differences in the cauda equina and mixed type. Neither were there any marked differences in the other findings observed.

The claudication distance increased in all types, but while the improvement (from 449 to 1,110 m) in the radicular type was statistically significant, the differences in the cauda equina (on the average 225 → 512 m) and mixed type (on the average 281 → 525 m) were not statistically significant.

Observation of lower extremity skin temperature with thermography revealed abnormal findings like cool regions in 8 out of 12 patients (62.5%) that were later found to improve during the acupuncture treatment<sup>7)</sup>. Moreover, observation of LCS patients using thermography showed also abnormal lower extremity skin temperature recovery patterns after a standing load shifting test. These anomalies reportedly improved in parallel with the acupuncture treatment induced improvement in clinical symptoms<sup>8)</sup>.

### 3) Inoue, M. 2000

In a patient (age: 70 years, claudication distance: 100 m) that had been almost unresponsive to 20 acupuncture treatments of paravertebral (intervertebral joint regions) points, dramatic improvements were reportedly obtained in leg pain and claudication distance after electroacupuncture stimulation of the pudendal nerve. Later, 3 more patients were described in whom this technique had been employed. Moreover, this author argued that experimental evidence showed that pudendal electroacupuncture stimulation induced an increase in sciatic nerve blood flow and thus verifies the hypothesis that improvements in the intermittent claudication are due to an improved circulation of peripheral nerves.

### 4) Watanabe, A. 1994

Five treatment sessions, applying mainly electroacupuncture on the paravertebral muscles, were administered in a patient (48-year old male) with LCS,

presenting leg pain and intermittent claudication, but did not produce any marked changes. For this reason, application of electroacupuncture along the course of the sciatic nerve was tried, upon which the leg pain and activities of daily living reportedly improved. In rats, not only electrical stimulation of the lumbar region or the pudendal nerve, but also electric stimulation of the sciatic nerve, reportedly led to an increase in the blood flow of the sciatic nerve<sup>9)</sup>.

The most commonly used acupuncture treatment described in Japanese literature appears to be needling in the vicinity of the intervertebral joints above the level of the segment responsible for the affection. Also, in patients where needling in the vicinity of the intervertebral joints did not produce any improvements, electrical stimulation of acupuncture needles inserted through the buttocks in order to stimulate the sciatic and pudendal nerves reportedly produced better results. Although we found only one classic text that described a traditional approach to the basic condition, this may simply indicate that acupuncture and moxibustion treatment based on a modern medical understanding of the pathology, is easier to publish, but in clinical practice either treatment form can be applied.

Improvements can be achieved for the clinical symptom intermittent claudication with pain since it tends to be more responsive to treatment than numbness. Moreover, acupuncture treatment results as classified by the type of morbidity appear on the one hand to be better for the radicular type (external) than the cauda equina type (internal), and on the other hand, better for the monoradicular type than the multiple radicular type.

## 3. Needling techniques

### 1) Needling in the vicinity of the intervertebral joints

Needling of the vicinity of the intervertebral joints comprises techniques called needling of "paravertebral points" and "intervertebral spaces", which both represent roughly the same concept. The paravertebral

points (from L3 to S1) are located 20 mm lateral from the spinous processes, while the "intervertebral spaces" are located 20-25 mm lateral from the spinous processes. The below outlined needling techniques have been described for the intervertebral spaces.

a) Needle insertion 20 mm lateral to the posterior edge of the lumbar and sacral spinous processes (or the interspinous process spaces)<sup>9)</sup>. In this case a propagated needling sensation should be felt in the buttocks or down into the legs.

b) Needle insertion immediately lateral to the lumbar and sacral spinous processes. From the paravertebral muscles, the needle tip is pointed slightly outward into the spaces between the transverse processes. Stimulation of a deeply situated, rubber-like resistance and confirmation that this elicits a propagated needling sensation resembling the clinical symptoms is achieved.

Apart from the vicinity of the intervertebral joints, needling has also been tried on the paravertebral muscles<sup>10)</sup> or the region adjacent to the foramina nervosa (needle insertion at approximately 30 mm lateral of the posterior edge of the lumbar and sacral spinous processes elicits a propagated sensation that spreads into the symptomatic region<sup>6)</sup>).

Needling of reactive regions in the buttocks or legs (symptomatic regions or areas in which tender points were found) is often combined with needle insertion in the vicinity of the intervertebral joints.

The length of stainless steel needles used varies between 40 and 60 mm and their thickness ranges from 0.24 to 0.3 mm. References specifying the depth of the needling give it as varying between 20 to 40 mm. Many references state the use of low frequencies of 1-2 Hz for the electrical needle stimulation. The frequencies used in Japan for the electroacupuncture stimulation are often lower than those used in Europe and America. The level of stimulation intensity is chosen in such a way that the patient does not feel any pain and the stimulation is thus performed within a comfortable intensity range. It should be noted that

this differs from the "maximal intensity tolerable by the patient". Apart from electrical stimulation, needle retention and manipulation, such as the thrusting and lifting technique are also performed. The duration of the stimulation often ranges between 10 and 15 minutes.

## 2) Electroacupuncture stimulation of the sciatic nerve

Needles are inserted three fingerbreadths lateral of the fourth sacral foramen with the needle tip slanting slightly inward. The needle enters the infrapiriform foramen and is then manipulated in such a way that it elicits a stimulus spreading through the innervation area of the sciatic nerve. Upon electrical stimulation rhythmical muscle contractions within the innervation area of the sciatic nerve can be observed<sup>10)</sup>.

The length of the used stainless steel needles is 80 mm and their thickness 0.3 mm. The needles are stimulated with frequencies between 1-2 Hz and stimulation intensity is chosen so that the patient does not feel any pain. The duration of the stimulation often ranges between 10 and 15 minutes. This is often combined with needling of the low back region.

While this technique is considered to be effective, pain develops occasionally after the needle insertion that spreads to the leg and can make the patient very uncomfortable. Nevertheless, this technique seems to be more widely used than the below described electroacupuncture stimulation of the pudendal nerve.

## 3) Electroacupuncture stimulation of the pudendal nerve

Needles are inserted at a point 50-60% away from the posterior superior iliac spine on the line connecting the posterior superior iliac spine and the ischial tuberosity. Insertion depth is 50 to 60 mm and the needles are manipulated until a propagated sensation spreading through the pubic region is obtained. Stainless steel needles with a length of 60-80 mm and a thickness 0.3 mm are used, that are then electrically stimulated with a frequency of 2 Hz for 10 minutes<sup>9)</sup>. This is often combined with needling of the low back region.

While this technique is considered to be effective, pain occasionally develops during or after the needle stimulation in the buttocks, that can make the patient extremely uncomfortable in addition to the already intensive sensation produces by the stimulation in the perineum, and thus requires appropriate attention<sup>9)</sup>.

#### 4. Examples of treatments for LCS in the TCT-Clinic

Below we would like to give a brief overview of the concrete acupuncture treatment for intermittent claudication performed in the TCT-Clinic for patients thought to suffer from LCS.

**Patient:** 65-year old male (self-employed). First visit: December 17, 1998.

**Chief complaint:** intermittent claudication (after walking for 200 m development of left low back and leg pain)

**Present illness:** onset of the condition approximately 1 year ago, diagnosis of LCS based on MRI findings, two different orthopedists recommended surgery, but the patient visited our clinic, because he wanted to try acupuncture before deciding on surgery. Pharmacotherapy using mainly analgesics and hypotensives.

**Findings:** SLR test, negative at 90 degrees. Other neurologic physical examinations were also normal.

Acupuncture treatment course: Four treatment sessions within one month, electroacupuncture in the lumbar and gluteal regions (Figure 1) and manual thrusting and lifting stimulation were performed, but did not lead to any improvement. Subsequently, direct moxibustion (placing moxa directly on the skin and burning it there) was performed in both gluteal regions (BL25 + BL26) as well as on tender points in the left gluteal region, burning 7 moxa cones consecutively on each point (Figure 2). Following that day the symptoms gradually started to improve and by March 1999 the patient could walk a distance of 2 km in one stretch. The third orthopedist in the university hospital then said that an operation would not be necessary. Currently, in June of the same year, the condition is maintained with the patient receiving two

treatment sessions per month while continuing his medication.

Because electroacupuncture (Figure 1) was ineffective in this patient we tried moxibustion. Some patients improve with electroacupuncture alone, in others both acupuncture and moxibustion are performed, but failure to obtain improvement with either of these modalities represents an indication for surgery.

#### 5. Conclusion

The above introduced Japanese literature allows one to conjecture that the radicular type (external type) could respond best to acupuncture, while symptoms in cases with marked deformities of the vertebrae or neurologic symptoms effects may be difficult to obtain.

Currently, because comparisons of acupuncture treatment and untreated control groups, or comparative trials with the addition of acupuncture to a conservative therapy have not yet been performed, no definite information on the scope of the merits of acupuncture treatment is available. Further, no information has yet been obtained pertaining to the effects on long-term prognosis.

Yet, appropriately performed general acupuncture treatment is considered to be a comparatively safe procedure, and in our opinion, is worthy for consideration as a possible choice in the conservative therapy of LCS.

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