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ULTRASOUND IN SCIATICA

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Investigation of the sagittal diameter of the spinal canal by ultrasound has shown a relative stenosis in patients with sciatica. In this study 12 patients who had recovered uneventfully after being operated on for herniated lumbar discs were found to have a broader spinal canal than 10 patients treated in the same way but still suffering from pain. Moreover, more difficulty was experienced investigating this latter group with the described "B-scan" technique. It is suggested that a preoperative ultrasound investigation would be able to indicate a narrow spinal canal and thereby reduce the number of disc operation failures.

Key words: myelography; sciatica; spine; ultrasonics

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A ruptured lumbar intervertebral disc is one of the causes of low back pain and sciatica. Many patients respond well to conservative treatment but in some the effect is merely temporary or there is no effect at all. These patients are often exposed to lumbar disc surgery. Good results after operative treatment have been reported in up to 90 per cent and the best results were obtained in patients having a positive straight leg test, neurological disturbances and positive myelography. Hirsch & Nachemsson (1963) state that the chance of finding a herniated disc in patients with a negative myelography, positive straight leg test and neurological disturbances is reduced to 50 per cent. The same authors found no disc prolapses in patients without these positive findings.

Verbiest (1954) was the first to point out the developmental narrow bony canal. The diameter in the lumbar bony canal was studied by Ramani (1976), who compared measurements made on radiograms from 100 patients operated on for prolapsed lumbar discs and 100 patients investigated for recent trauma. The patients with operated discs were found to have a narrower lumbar canal.

Porter et al. (1978a) described the use of ultrasound for measurements on the lumbar spinal canal, and found a high incidence of narrowing in the presence of disc symptoms (Porter et al. 1978b).

Carrera et al. (1978) showed that computerized tomography in sciatica could differentiate between facet joint abnormalities and herniated discs, but the spinal canal was not measured in their work.

The purpose of this investigation was to measure the spinal canal by a non-invasive technique in patients operated on for herniated lumbar discs.

PATIENTS AND METHOD

During the years 1975 to 1978, 158 patients were operated on for herniated lumbar discs in the Department of Orthopaedic Surgery, Lund University Hospital. Out of these, 115 had positive myelograms and positive findings at operation. At a follow-up, 2–6 years after the operation, 95 patients reported good results and 20 still had pain. Ten patients who still had pain and a comparable group of 12 patients who had recovered uneventfully were selected for this study. Ten women and 12 men, mean age 46 (32–56 years), had

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their spinal canal examined using the "B-scan" ultrasound apparatus (Unirad EDP 1000, 3.5 MHz).

The patients were examined in a prone position. A hard pillow was placed under the abdomen to straighten the back and thereby facilitate the examination. The spinal canal was examined longitudinally with the 3.5 MHz transducer directed medially at an angle of 10–15° to the sagittal plane. An examination was performed on both sides of the spine. The cranial part of the iliac crest was marked out to obtain the correct level when comparing with the plain films of the spine. The "B-scan" equipment was used in the "Outline-modality", where only the strongest echoes were singled out by using electronic filtering. This procedure resulted in a B-scan of "bistable" appearance. Electronic calipers were used for calculating the distance between the two strongest echoes on either side of the canal.

This procedure makes it possible to measure directly from the "B-scan" picture, where the measuring points are directly related to the anatomic structure in question (Figure 1).

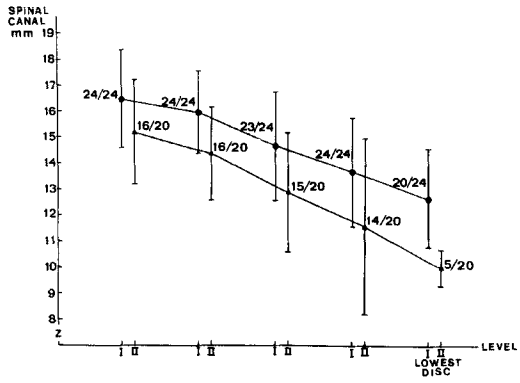

Figure 2. Filled circles represent patients recovering well after operation for herniated lumbar discs (group I), filled triangles represent the patients still suffering from pain after the operation (group II). Mean values and variations are demonstrated at the lowest 5 disc levels in both groups.

RESULTS

The spinal canal when measured over the lowest five discs differed in the two groups of patients (Figure 2).

Group I (12 patients), the patients who recovered well after the operation, was easier to examine than the other group. Twenty-four measuring sites should be demonstrated in the first group at each level since the canal was examined both from the right and the left side. Only 5 out of 120 possible sites could not be visualized. In group II (10 patients), where the patients still suffered from pain, 34 out of 100 possible sites could not be visualized. The non-visualized levels showed skeletal changes in plain film examinations, such as arthrosis of the intervertebral joints or marked reduction of the disc space with a subluxation of the intervertebral joint.

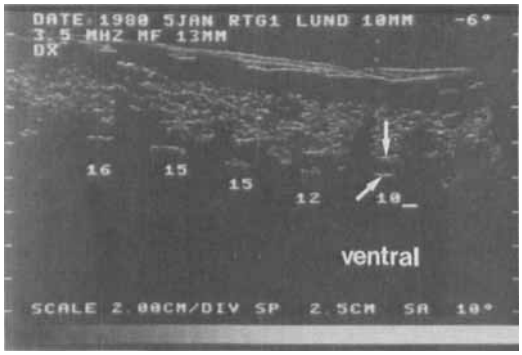

Figure 1. A patient lying prone examined from the right side of the spinal canal at an angle at 10° to the sagittal plane. The numbers in the picture represent the distance in mm between the strongest echoes indicated by arrows from the ventral and dorsal margin of the canal.

In group I the spinal canal measured 12.7 ± 1.9 mm (20/24 sites visualized) at the lowest level, proceeding upwards 13.7 ± 2.1 mm (24/24), 14.7 ± 2.1 mm (23/24), 16 ± 1.9 mm (24/24) and 16.5 ± 1.9 mm (24/24) at the highest of the five discs.

In group II the measurements were 10 ± 0.7 mm (5/20 sites visualized) at the lowest level, 11.6 ± 3.4 mm (14/20), 12.9 ± 2.3 mm (15/20), 14.4 ± 1.8 mm (16/20) and 15.2 ± 2 mm (16/20) at the highest of the five disc levels.

DISCUSSION

The symptoms from herniated discs can be expected to be aggravated by the presence of a narrow spinal canal. Porter et al. (1978b) found normal values of the width of the spinal canal to be 16.8 mm at the L1 level, diminishing to 15.7 mm at the L5 level.

We prefer to talk about the five lowest discs, as

3 patients in our material had six free lumbar vertebrae.

Porter found a narrower canal in patients with symptomatic disc lesions. The technique used by Porter differs to some degree from the one used in this study where a proper visualization of the margins of the canal was necessary before measurements could be made.

We failed to visualize the spinal canal in some of the patients who had residual symptoms after operation. All these failures could be related to skeletal changes which might block the "acoustic window" at the back of the spine. This could lead to the assumption that skeletal changes of some magnitude are to be expected when the spinal canal cannot be visualized by ultrasound using the modified "B-scan" technique described here.

The values for the width of the spinal canal at each level in our material were less than the normal values suggested by Porter et al. (1978b). This difference was even more marked in group II, including a considerable number of technical failures especially at the lowest disc levels. The findings in this small material indicate that patients with a marked narrowing of the spinal canal or blocking of the "acoustic window" at ultrasound examination might be difficult to cure with the conventional technique used for operations on herniated discs.

Patients with blocking of the "acoustic window" should perhaps be subjected to computerized axial tomography before operation in order to visualize the skeletal changes in question. Carrera et al. (1980) found 14 out of 48 patients with herniated discs on CT to have a facet joint abnormality as well.

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