The Use of Computer-Assisted Tomography of the Lumbar Spine in a Chiropractic Practice

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ABSTRACT: A review of the records of 23 chiropractic patients who underwent lumbar computer-assisted tomography (CT) scans is reported. Further diagnostic information was gained in 21 of the 23 cases following the scans. Aspects of the use of CT scans by chiropractors are briefly discussed.

INDEX TERMS: Computer-assisted tomography, lumbar spine, plain radiograph, chiropractic.

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INTRODUCTION

High-resolution computer-assisted tomography (CT) scans have been constantly evaluated for their usefulness in the diagnosis of lumbar spine abnormalities since their introduction in the late 1970s. Such evaluation has suggested the use of CT scans as the diagnostic modality of choice when studying intervertebral discs.[1-4]

The CT scan has also shown its value in the diagnosis of facet arthropathy,[5] spinal canal and neural deformity,[2 5-8] spondylosis,[2 5-8] spinal neoplasm,[9] spinal trauma[10] and congenital spinal abnormalities.[11] A search of the literature failed to show any evidence of the use of CT scanning by the chiropractic profession in Australia.[12]

A review of the case records of 23 chiropractic patients who had had lumbar CT scans was conducted and the findings of the CT scans compared with the plain radiographic findings. The review was conducted to ascertain, *inter alia*, whether CT scanning of the lumbar spine is a useful diagnostic procedure for the chiropractor.

METHOD

The case records of 23 chiropractic patients referred for lumbar CT scans were reviewed. Of these 23 patients, 6 presented with acute sciatica, 13 with chronic sciatica and 4 with chronic low back pain. The plain radiographs of the three groups were analysed and compared with the CT scan findings.

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RESULTS

The results for each of the groups and management procedures (Table 1) are as follows:

Acute Sciatica

Of the 6 cases, 4 were males and 2 females; the average age was 45. The group included 5 cases of unilateral sciatica and one case of acute right-sided thigh pain thought to be referred (Case 3, Table 2).

Four of the 6 cases demonstrated neurological changes in the lower limbs. The average duration of pain at the time of referral for CT was 3.5 weeks, with a maximum of 6 weeks and a minimum of 1 week. Table 2 summarizes the results of the acute sciatic group, and in all 6 cases further important information was obtained using the CT scan. Further, the findings of the plain radiographs did not correspond to the CT findings. Four cases later received conservative physical treatment and management, while 2 cases required surgical intervention.

The significant similarities in the acute sciatica group were that all had acute unremitting leg pain which was thought to be referred and had received therapeutic management including analgesics and rest which did not provide adequate relief nor alter the course of the condition.

TABLE 1 TYPES OF MANAGEMENT

I: Conservative physical management which consisted (where indicated) of spinal manipulation, traction, exercise program, electrotherapy and acupuncture.

II: Conservative physical management plus anti-inflammatory medication.

III: Epidural steroid injection performed by an orthopaedic physician.

IV: Myelogram ordered by orthopaedic surgeon for the purposes of further evaluation.

V: Surgical intervention — usually consisting of foraminotomy and discectomy (not laminectomy).

VI: Discogram negative, bone scan shows uptake around pars defect. Fusion contemplated.

VII: Surgery contemplated.

VIII: Facet joint steroid injections.

Chronic Sciatica

Of the 13 cases in this group 9 were males and 4 females; the average age was 34. The group consisted of 12 cases of unilateral sciatica and one case of bilateral buttock pain without leg pain (Case 15, Table 3). Eight of the 13 cases demonstrated neurological changes in the lower limbs. The average duration of pain was 20 months, with a minimum duration of 6 weeks and maximum duration of 10 years.

Table 3 lists the results for this group and clearly significant additional information was provided in 11 of the 13 cases. The chronic sciatica group all had chronic, unresolving leg pain which was thought to be referred. Conservative management was extensive, yet the patients' condition was not improved. Five cases later underwent conservative physical treatment and management (see Table 1). Two of these also had anti-inflammatory medication, five underwent surgery, and in two other cases surgical intervention was contemplated. One case had an epidural steroid injection.

Chronic low back pain

All four cases were male, average age 47. Each patient had chronic low back pain without neurological deficit. The average duration of pain was five years, with a minimum of 6 months and a maximum of 10 years.

The findings of the CT scans (Table 4) provided significant additional information in all four cases. The chronic low back pain group all had chronic, unresolved back pain following extensive conservative physical treatment and management.

Management following CT scanning was different in all four cases.

TABLE 2 ACUTE SCIATICA GROUP

Case No.	Summary of plain radiograph findings	Summary of CT findings	Management
1-2	No abnormality detected	L5/S1 disc prolapse	V,V
3	No abnormality detected	All discs from L2-S1 show broad based bulging.	II
4	Mild narrowing of the L5/S1 disc space	Massive prolapse of the L4/5 disc	II
5	Mild narrowing of the L1/2, L2/3 disc spaces	L5/S1 disc protrusion with canal stenosis	II
6	Severe narrowing of the L5/S1 disc space	L4/5 disc prolapse	II

TABLE 3

CHRONIC SCIATICA GROUP

Case No.	Summary of plain radiograph findings	Summary of CT findings	Management
7-9	No abnormality detected	L5/S1 disc prolapse	VII, V, V
10	No abnormality detected	L4/5 disc prolapse	V
11	No abnormality detected	No abnormality detected	I
12	No abnormality detected	L5/S1 facet joint hypertrophy with lateral recess stenosis	III
13-14	Minor postural abnormalities	L5/S1 disc prolapse L4/5 disc prolapse	V V
15	Minor narrowing of L5/S1 disc space with bilateral sagittal facets at L5/S1	L4/5 disc bulge and an L5/S1 disc prolapse	II
16	Mild discogenic spondylosis at L4/5	Canal narrowing at L4/5 due to facettal arthropathy	I
17	Mild discogenic spondylosis at L3/4	Spinal stenosis at L4/5 L5/S1 produced by congenitally narrow canal and ligamentum flavum hypertrophy	I
18	Mild narrowing of L5/S1	L5/S1 disc prolapse	II
19	Spondylolysis at L5/S1 on the left only	Spondylolysis at L5/S1 on the left only	VI

TABLE 4

CHRONIC LOW BACK PAIN GROUP

Case No.	Summary of plain radiograph findings	Summary of CT findings	Management
20	Advanced discogenic spondylosis at L5/S1 level with facet joint degeneration	L5/S1 bulging and degeneration with facettal arthropathy at L4/5 and L5/S1	IV
21	Advanced discogenic spondylosis at L3/4 with minor changes at L4/5, L5/S1	Posterior spondylophyte at the level of L5/S1	II
22	Moderate degenerative changes at L3/4, L4/5 and L5/S1 levels	Moderate canal stenosis with disc protrusions at L4/5 and L3/4	III
23	Hemilumbarisation of L5 on the left, limbic bone noted at L5 superiorly	Same as plain films plus L4/5, L5/S1 facettal hypertrophy and sclerosis	VIII

DISCUSSION

This study shows that in 21 of 23 cases further diagnostic information was obtained using CT scans. When the results were essentially the same between the plain radiographs and the CT scans (Cases 11 & 19), it is suggested that the negative information from the scans assisted in the differential diagnosis. In 15 of the 19 cases of sciatica, CT scans demonstrated disc prolapse, protrusion or bulge in locations corresponding to the clinical findings. In each of the 4 non-sciatic cases, CT scans provided further diagnostic information. The findings of only 8 of the 23 plain radiographic series matched the level of involvement identified on CT scans (Cases 11, 15, 16, 18-22). Recent research has shown that the plain radiograph is not a good indicator of lumbar pain. In a study by Witt *et al*[13] x-rays of 238 patients with low back pain and sciatica were compared with x-rays of 66 patients without low back pain. No difference between the two groups could be demonstrated concerning the incidence of spondylosis and disc degeneration. The present study demonstrates that plain radiographs have limited diagnostic value, and the use of CT scans ought to be considered in some cases that present to chiropractors.

Before the advent of CT scans, the myelogram was the diagnostic procedure of choice used to study intractable back pain or sciatica.[14] However, it is unlikely that the CT scan will completely replace the use of myelographic studies of the spinal canal, notably immediately prior to surgery.[15]

CT scans, like plain radiographs, do not demonstrate pain. Weisel *et al*[16] showed that over 35% of asymptomatic people were found to have abnormal CT scans, and over 19% of those study subjects under the age of 40 were diagnosed as having herniated nucleus pulposus. Wiesel *et al* also concluded that the credibility of the CT scan of the lumbar spine as a diagnostic tool is by and large dependent on its correlation with the clinical findings. Also, Eldevik *et al*[17] found, in a study on the effect of clinical bias on CT interpretation, that observers tended to interpret questionable scans as positive when they correlate with clinical findings.

Two other aspects of CT scanning which need to be considered are first, the radiation dose to the patient and second, the cost. Wilson and Sage[18] state that depending on machine design and image quality selection, it is possible to achieve radiation doses for multiple-slice CT studies which are only a few times the skin dose of conventional plain radiography. These factors should be weighed carefully against the expected diagnostic information to be gained.

CONCLUSION

This study indicates the increased diagnostic information gained with CT scans of the lumbar spine for chiropractic patients presenting with:

1. Acute sciatica and acute low back pain where the pain in unremitting and appropriate therapeutic management has not improved the condition.
2. Chronic sciatica and/or chronic low back pain where the pain is unresolving and where extensive management has been unsuccessful.

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