

CT examination of 91 patients after chemonucleolysis

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Ninety-one patients underwent a repeat CT examination 2-3 months after chemonucleolysis. In 39 patients the size of the herniation was unchanged; no correlation could be found between the CT examination and the clinical results. One year after chemonucleolysis, 27 of the patients underwent a third CT examination. The majority of

the scans revealed a reduction of the herniation, while 16 of the patients still had a hernia. No correlation could be found between the clinical results and the CT examination.

We conclude that a repeat CT examination after chemonucleolysis does not permit evaluation of patients with persistent or recurrent radicular pain.

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The role of the CT examination in the evaluation of patients with persistent radicular pain after chemonucleolysis is controversial (Konings et al. 1984, Mall and Kaiser 1984, Gentry et al. 1985, Boumpfrey et al. 1987). Therefore, we performed a CT examination of 91 patients before chemonucleolysis and repeated the examination 2-3 months after treatment.

Material and methods

Between 1984 and 1987, 100 patients with an overt monoradicular sciatica who had been treated conservatively, but without relief, entered the study. In all the cases, the CT scan showed unequivocally a disc herniation; thus, these patients were all considered eligible for chemonucleolysis. The following criteria were regarded as contraindications for chemonucleolysis: age older than 65 years or younger than 14 years, a severe neurologic deficit, previous chemonucleolysis, bony abnormalities that could be responsible for root compression and spondylolisthesis.

The average age of the patients (58 males, 42 females) was 36 years, and all of them were treated with 4000 E chymopapain.

Before and 2-3 months after chemonucleolysis, a CT examination was performed (scanner type Somatom SF, Siemens); the thickness of the sections was 8 mm, and the table movement was 5 mm at the levels L3-4, L4-5, and L5-S1. The gantry angulation was as perpendicular as possible.

The following data from the CT scan before treatment were recorded:

1. Size of the disc herniation (area seen outside the endplate of the vertebral body in millimeters on the CT scan, reduction 3.65).
2. Diameter of the spinal canal at the level of the herniation.
3. Quotient: size herniation/diameter spinal canal.

The following data from the CT scan after chemonucleolysis were recorded:

1. Reduction of the herniation; clear, moderate, minimal, none or increased.
2. Quotient: size herniation/diameter spinal canal.
3. Reduction of root compression: yes/no.

A small group of patients (n 27) underwent a third CT examination 1 year after treatment. The reduction of the herniation and the reduction of the root compression (compared with the scan before treatment) were scored.

The clinical results of chemonucleolysis were assessed 1 year after treatment. Each patient's condition was classified as good, moderate, or poor based on the following criteria: the intensity of low back pain and leg pain, motor weakness, sensory deficit, and the need of a discectomy. The results and correlations were analyzed using Pearson's *r* and the chi-square test.

Two patients were lost during follow-up, and 7 patients refused to undergo the repeat CT investigation after chemonucleolysis. Therefore, 91 sets of CT scans obtained before and after the treatment were available for our study.

Results

Chemonucleolysis produced a good clinical result in 72 percent of the cases, moderate in 13 percent, and poor in 15 percent (n 98); 12 percent of the patients, all with a poor result, underwent surgery during the year after chemonucleolysis.

The results of the CT examination before treatment (n 91) were as follows: average size of the herniation: 3.5 mm (SD 1.36), average diameter of the spinal canal: 8.0 mm (SD 1.85), and average quotient size herniation/diameter spinal canal: 0.42 (SD 0.16). The average quotient: size herniation/diameter spinal canal after 3 months was 0.32 (SD 1.4; Table 1).

There was no correlation between the results of the CT examination 2-3 months after chemonucleolysis and the following clinical parameters at that time: intensity of low back pain or leg pain, sensory deficit, motor weakness, and Lasègue's sign. The value of the CT examination 3 months after chemonucleolysis for predicting the result 1 year after treatment was limited.

For those patients with a poor result 1 year after chemonucleolysis, the CT scan 3 months after treatment revealed less reduction of the herniation than that seen in patients with a good or moderate result ($P = 0.01$).

The predictive value for the individual patient was nevertheless unimpressive. If there was any reduction in the size of the disc herniation 3 months after chemonucleolysis, the probability of a poor result was 6 percent; if there was no reduction at all or the size of herniation had increased, the probability of a poor result was 21 percent. A combination of clinical data and the results of the CT examination 3 months after treatment did not reinforce the predictive value.

One year after treatment, there was no correlation between the results of the CT examination and the clinical results.

Discussion

Persistent or recurrent radicular pain frequently occurs after chemonucleolysis, and therefore it is difficult to ascertain whether or not chemonucleolysis has failed. A CT examination is often performed when surgery is planned after a clinically failed chemonucleolysis. Our results show that, although the average CT scan size of the hernia was reduced 2-3 months after chemonucleolysis, there

Table 1. Results of CT examination 3 months and 1 year after chemonucleolysis

	CT 3 months after treatment (n 91)		CT 1 year after treatment (n 27)	
Reduction of herniation	Clear	32	Clear	17
	Moderate	12	Moderate	4
	Minimal	7	Minimal	2
	None	39	None	4
	Increase	1	Increase	0
Root compression	Yes	34	Yes	14
	No	57	No	13
Correlation with clinical symptoms	No		No	

was no change in the size of the herniation in 43 percent of the cases. Also the CT examination 3 months after treatment correlated poorly with clinical symptoms.

The fact that many patients are free from pain 3 months after chemonucleolysis, whereas the CT scan may show an unaltered herniated disc, raises the question of how relief of pain is achieved with this treatment. During the first 3 months, the reduction of root compression is probably achieved mainly by narrowing of the intervertebral space at the level of the herniation. A positive correlation between the degree of narrowing of the intervertebral space 3 months after treatment and the clinical result at that time has been demonstrated (Bitz and Ford 1977, McCulloch 1977, Ford 1979, Spencer and Miller 1983, Wiltse 1983).

Our results reveal that a CT scan after chemonucleolysis frequently does not differ from the CT scan obtained before treatment. Also CT findings after chemonucleolysis do not correlate with the clinical results. In the event of persistent radicular pain, a repeat CT examination 2-3 months after chemonucleolysis should not play a role in selecting patients for surgery.

References

- Bitz D M, Ford L T. An evaluation of narrowing following intradiskal injection of chymopapain. *Clin Orthop* 1977; 129: 191-5.
- Boumprey F R, Bell G R, Modic M, Powers D F, Hardy W R. Computed tomography scanning after chymopapain injection for herniated nucleus pulposus. A prospective study. *Clin Orthop* 1987; 219: 120-3.

- Ford L T. Chemonucleolysis by chymopapain. *Curr Pract Orthop Surg* 1979; 8: 38-57.
- Gentry L R, Turski P A, Strother C M, Javid M J, Sackett J F. Chymopapain chemonucleolysis: CT changes after treatment. *Am J Roentgenol* 1985; 145 (2): 361-9.
- Konings J G, Williams F J, Deutman R. The effects of chemonucleolysis as demonstrated by computerised tomography. *J Bone Joint Surg (Br)* 1984; 66 (3): 417-21.
- Mall J C, Kaiser J C. Post chymopapain (chemonucleolysis) clinical and computed tomography correlation: preliminary results. *Skeletal Radiol* 1984; 12 (4): 270-5.
- McCulloch J A. Chemonucleolysis. *J Bone Joint Surg (Br)* 1977; 59 (1): 45-52.
- Spencer D L, Miller J A A. The mechanism of sciatic pain relief by chemonucleolysis. *Orthopedics* 1983; 6: 1600-3.
- Wiltse L L. Chemonucleolysis in the treatment of lumbar disc disease. *Orthop Clin North Am* 1983; 14 (3): 605-22.