

## Cervical Disc Injury Subsequent to Motor Vehicle Collision Accidents

Patients often develop neck pain and radiating arm pain secondary to a whiplash-type injury after a motor vehicle accident. The cervicgia and brachialgia can often be progressive. The literature has supported that disc injuries are common secondary to MVA despite those in the insurance industry who profess that all disc lesions are entirely degenerative in nature.<sup>1,2,3,4</sup>

Scientific studies have shown that flexion/extension loads can cause the disc to fail as seen in MVAs. In a pathoanatomic study, Jonsson, et al. found a high incidence of discoligamentous injury in a study of 20 traffic accident victims who suffered lethal skull fractures.<sup>1</sup> In another study by Jonsson, et al., MRI scans were obtained in patients with persistent symptoms secondary to a whiplash injury.<sup>2</sup> Disc lesions were graded by severity ranging from grade 0 (no disc lesion) to grade 4 (a large disc protrusion compressing the spinal cord) Signal reduction was seen in over 34% of the discs studied. In 18 patients, there were also disc protrusions with 16 levels of discs graded 1 or 2, and 11 levels graded at 3 or 4. Fifty percent of the grade 3 or 4 disc protrusion patients had onset of radiating pain within days after the MVA. Ten of the 19 patients had persistent spine and radiating pain at follow-up.

Their study found several cases of inconsistency and incongruence between clinical findings and MRI findings, which led them to conclude that MRI isn't indicated in the early stages of these patients. Their study neglected to discuss the sinuvertebral innervation, and intra-dural nerve connections of the cervical disc which has been shown by Bogduk, et al. to innervate the level of entry as well as up to two levels above. As such, the innervation of the disc is via somatic and sympathetic nerve endings in an overlapping multisegmental fashion that will not always result in level specific correlation.

In a study by Davis, et al., MRI was found useful in patients with cervical hyperextension injuries.<sup>3</sup> Borchgrevnik studied 52 patients with MRI and plain film x-rays subsequent to whiplash injuries from MVAs.<sup>5</sup> They found that patients with spondylosis had more symptoms and a worse prognosis. Peterson, et al. found in their study of 39 cases of whiplash injured patients who had MRI scans that 25 of the 39 had disc lesions.<sup>6</sup> Twenty-nine patients had neurological deficits with sensory abnormalities. Twenty-two of 26 patients with abnormal MRI had correlating neurological signs (80%). Despite the above findings, they concluded there was poor correlation between MRI and clinical findings in this population of patients. Their study did not take into account the polysegmental innervation patterns of the cervical disc by the sinuvertebral nerve.

The same authors published similar data in a recent publication with the addition of MRI and clinical follow-up two years after the initial assessment.<sup>7</sup> They state that MRI is indicated in the later stages of treatment as opposed to the acute stage due to the high proportion of false negatives seen in studies by Boden and Jensen.<sup>8,9</sup> In these studies abnormal MRIs in asymptomatic volunteers were observed; however, these volunteers had no symptoms.

The Peterson study found a significant percentage of disc herniations in whiplash injured patients initially and at two years follow-up. They found that MRI scans at the two year follow-up revealed that two cases got worse, two cases got better, and eight cases showed no change at all in disc pathomorphology. This is in contrast to a study I recently published in JMPT which found that 80% of patients with disc injury clinically improved, and that of this 80%, 2/3 showed reduced or resolved disc herniation on repeat follow-up MRI.<sup>10</sup>

Clearly, disc injuries can and do occur subsequent to motor vehicle collision type injuries. This is supported by the literature and is seen every day in most DCs' offices across the country. In a study of patients with signs and symptoms suggestive of disc injury subsequent to MVA, MRI was correlated with clinical findings and sensory abnormalities objectively assessed by current perception threshold/quantitative sensory testing (CPT-neurometer). This study, which has been submitted for publication, found a significant correlation of post-MVA disc injuries.<sup>11</sup>

MRI plays an important role in patients suspected of having disc injuries subsequent to whiplash in that it helps determine size, location, and severity of disc protrusion. Furthermore, it can delineate cases where there is an associated spinal stenosis with HNP that may or may not compress the spinal cord. This scenario may contraindicate high velocity rotational manipulative procedures in lieu of nonforce type techniques (i.e., traction, flexion distraction).

In patients with persistent radicular arm pain and/or neurologic abnormalities, MRI is clearly indicated for diagnostic, prognostic, and clinical decision making purposes.

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