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CASE REPORT

Manipulation of the Low Back Under General Anesthesia: Case Studies and Discussion

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MANIPULATION UNDER ANESTHESIA (MUA) is intended to restore normal joint motion and musculoskeletal function. Injured areas with excessive fibrosis, especially following surgery, have responded well to this procedure. MUA should be limited to those patients who have specific musculoskeletal disorders that are chronic, have failed to respond to conservative treatment, have disability which may be relieved by the procedure, or have severe symptoms which might be temporarily improved by the procedure. Two cases are presented in which multiple surgeries failed to relieve low back pain and sciatica. Both of these patients had failed to receive any lasting benefit from any of the modalities employed in their care. Prior to the procedure, advanced imaging studies with contrast confirmed damage to intervertebral discs, as well as fibrosis in the region of prior surgery. The procedure was performed in the hospital, with manipulations done on 3 consecutive days. Physical therapy was used as adjunctive therapy three times per day and outpatient therapy was continued for a month. Following this course of treatments, there was marked improvement in pain, with improvement in the orthopedic and neurologic exam. Medication use was decreased and functional capacity increased. The results suggest that manipulation under anesthesia may be beneficial in selected patients with failed back surgery syndromes. (JNMS: Journal of the Neuromusculoskeletal System 1:126–134, 1993)

Key words: Back pain, Failed back surgery, Manual medicine

Manipulation under anesthesia (MUA) has been used successfully for many years in treating acute and chronic musculoskeletal conditions that are unresponsive to conservative care (1–12). Anesthesia is employed to eliminate the pain and muscle spasm that may limit other forms of mechanical treatment. Appropriate patient selection, knowledge of indications and contraindications, suitable anesthetic, and qualified personnel who are trained in structural diagnosis and manipulative technique are required for safety and effectiveness. This is enhanced by a team approach. Two cases are presented in which there was symptomatic and functional improvement when other treatments, conservative and pharmacologic, as well as surgical, had failed.

Failed back surgery syndrome is a common indication for MUA. This may result from poor patient selection for the original surgery or other causes including recurrent herniation, herniation at another level, discitis, unrecognized lateral stenosis, vertebral instability, or epidural fibrosis. Epidural fibrosis may have associated leg pain, and frequently results from microhemorrhage and inflammation following surgery. Therefore, this condition tends to respond poorly to surgical reexploration. Scar tissue can best be differentiated from recurrent herniated nucleus pulposus (HNP) by utilization of gadolinium-enhanced magnetic resonance imaging (MRI), since scar tissue generally enhances brightly while recurrent HNP does not.

CASE REPORT #1

A 48-year-old male presented with an initial complaint of low back pain following an injury to his low back in August 1980. Myelography in September 1981 indicated a lack of filling of the nerve root sheath at L_5–S_1 on the right with posterior disc bulges at L_4–L_5 and L_5–S_1. In November 1981 a lumbar venogram showed no abnormality in the venous plexus. A CT scan was performed in November 1981 revealing a partially calcified 5-mm disc herniation at L_5–S_1 encroaching into the neural foramina bilaterally (more severely on the right) and a 5-mm central disc herniation at L_4–L_5 extending into the neural foramina bilaterally. Additionally, there were hypertrophic degenerative changes in the superior articular facets bilaterally at L_4–L_5 and L_5–S_1. In July 1984 he underwent an epidural anesthetic and steroid injection at the L_4–L_5 level. This procedure resulted in a temporary decrease in low back pain. In September 1984 he had a hemilaminectomy and discectomy at L_4–L_5, L_5–S_1 and foraminotomies around the nerve roots at L_5–S_1. He returned to work in March 1985 and by the end of April 1985 complained of a

stiff back, with pain and numbness of the toes in the right foot. The patient had hypalgesia and hypesthesia of the right foot with an absent ankle jerk reflex. He underwent further epidural injection of local anesthetic and steroid in July 1985, May 1986, and July 1987, each time with temporary improvement.

In September 1991 an MRI of the lumbar spine with contrast was performed revealing epidural scar tissue at L_4–L_5, L_5–S_1 with encasement of the right L_5 and S_1 nerve root in the spinal canal and lateral recess. A small disc protrusion at L_4–L_5 without displacement of the thecal sac and a small central disc bulge at L_5–S_1 was also shown. In December 1991 he was admitted to the hospital again for medication and physical therapy. After discharge he continued with outpatient physical therapy, a transcutaneous electrical nerve stimulation (TENS) unit, Darvocet, and Valium. He again had an epidural injection for pain in June 1992.

He was advised of the procedure for manipulation under anesthesia by a neurosurgeon as an alternative treatment avenue. At the time, the patient was totally disabled, being restricted to lying supine despite large doses of analgesic medications. In July 1992 he was admitted to the hospital for the purpose of manipulation under anesthesia.

Examination prior to MUA included a pain level of 9+ (on a 0–10 scale). Straight-leg raise (SLR) resulted in pain in his low back and bilaterally down his legs (30 degrees on the right and 45 degrees on the left). Braggard's sign was positive on the right. Lumbar range of motion (ROM) was less than 50% of normal, producing pain in all directions. Flexion was reduced by about 70%. Paraspinal muscles were tight and tender to touch from L_2 to S_1. There was radicular pain down both legs (worse on the right) with hypesthesia over the L_5 dermatome on the right.

He underwent 3 consecutive days of MUA as described in the discussion. Also, he received physical therapy three times per day in the form of interferential electrical stimulation, ultrasound, heat, and massage. There was marked improvement in his pain by the time of discharge.

One month post-MUA he reported a pain level of 2 (on a 0–10 scale), with an SLR of 85 degrees on both sides without radicular pain. Braggard's sign was negative and lumbar ROM was within 90% of normal. Sensation was normal over the right L_5 dermatome. Six months post-MUA his straight-leg raise was 80 degrees and he still had some pain and stiffness. However, he judged the pain level of 3–4 as much improved over his pre-MUA condition. At that time the patient moved out of the state to accept employment.

CASE REPORT #2

This patient's initial back injury occurred in 1977 (age 35) when lifting a 450-pound steel plate with a co-worker. His partner dropped his end while the patient tried to hold on, injuring his back. Over the succeeding years, he found his ability to work was limited to short periods due to back and left leg pain. In January 1985 he reinjured his back by bending forward. In June 1985 he had back surgery with a partial disc resection at L_4–L_5 and L_5–S_1. He improved somewhat but 3 months later the pain returned, at which time he underwent a second procedure with lumbar fusion. Again, he improved for a time, but back and leg pain gradually returned. An MRI in November 1986 (Fig. 1) revealed postoperative changes, along with degenerative changes of the L_4–L_5 disc with lateral herniation effacing the L_5 nerve root. A 7- to 8-mm triangular density appeared to obliterate the left S_1 nerve root, suggesting an extruded disc fragment compromising the left S_1 nerve root. In December 1986 he underwent another laminectomy with removal of scar tissue and lysis of adhesions. He improved for a time but then noted increasing back and left leg pain.

His past medical history includes a crush injury to his left

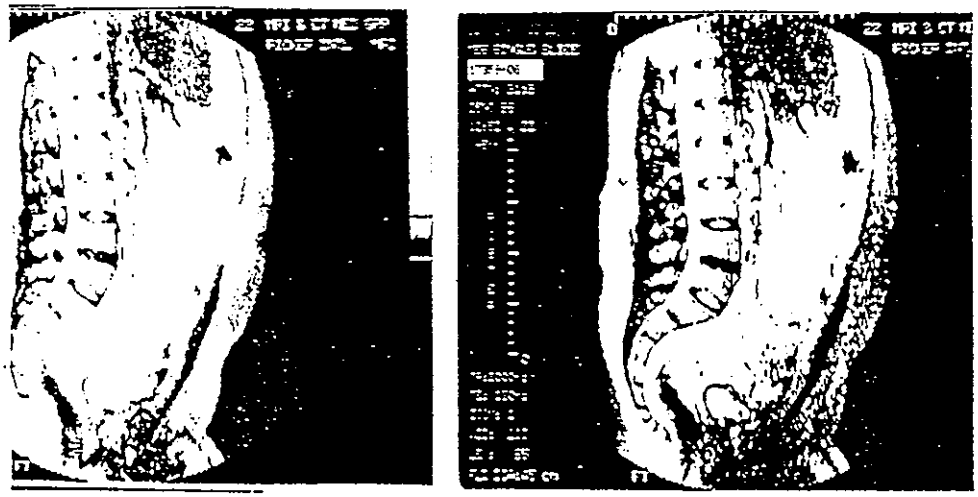

FIGURE 1. T_2-weighted MRI scan in the sagittal plane through the lumbar spine in November 1986 (after second surgery).

heel which occurred in a fall in 1984. He had had five surgical procedures for foot reconstruction. In February 1986 he underwent a triple coronary bypass and in May 1988 he had coronary angioplasty during which one vessel could not be dilated. In July 1988 he had a motorcycle accident, sustaining multiple contusions, abrasions, and fracture of the left wrist.

Prior to the MUA he was using a TENS unit, without much relief. He was taking Soma with codeine, Percocet, oral Demerol, Darvocet, and Tylenol #4 in different combinations for pain relief. He also used aspirin, Prozac, Humulin-N (diabetes), Cardizem, and Tenormin, with occasional nitroglycerin (for angina).

With worsening symptoms, a series of imaging procedures were performed in the fall of 1987. A CT scan in October 1987 showed a 6-mm disc bulge at L_4–L_5 with the dural sac indented on the left side with relative canal stenosis. The L_5 nerve root appeared swollen or thickened. A complete laminectomy was shown. There was a slight disc bulge at the L_5–S_1 level, displacing the S_1 nerve root posteriorly and a slight posterolateral bulge into the neural foramen at the L_3–L_4 level.

A myelogram in October 1987 reported a lack of filling of the L_5 and S_1 nerve root sleeves on the left, and suggested scar tissue around the S_1 nerve root and a complete left laminectomy and facetectomy at the L_4–L_5 level. In December 1987 the CT scan was repeated, revealing a deviation of the thecal sac to the right by soft tissue filling the laminectomy defect, and an area with soft-tissue density involving the anterolateral portion of the central canal at the L_4–L_5 and L_5–S_1 level on the left. An MRI of the lumbar spine in December 1987 (Fig. 2, A–D) showed postlaminectomy changes on the left at the L_4–L_5 and L_5–S_1 levels. Scarring was seen on the right side of the thecal sac at L_4–L_5, with a small disc bulge at the L_5–S_1 level. There was reported congenital spinal canal stenosis at L_4 and L_5, degenerative changes at the L_4–L_5 disc, and a small left paracentral disc herniation on the left at L_4–L_5. This effaced the left L_5 nerve root before it entered the lateral recess. He continued to have pain and in March was admitted to the hospital following a suicide attempt.

Another surgery was performed in January 1988, consisting of a decompressive laminectomy at L_4–L_5 and L_5–S_1, with foramenotomy and lysis of adhesions. The nerve roots were reported to be encased by severe scarring. The pain returned and in September he was hospitalized and given intravenous morphine with inpatient physical therapy. Examination at that time revealed forward flexion to be limited (finger tips 19 inches from the floor), with decreased sensation over the left lateral thigh, calf, and foot.

In August 1989 a CT of the lumbar spine showed the laminectomy changes at L_4 through S_1 with obliteration of the central and lateral canal at the L_4–L_5 and L_5–S_1 levels by soft-tissue density. This was interpreted as postsurgical changes of fibrosis and possible arachnoiditis. Additional help was sought by a neurosurgeon in July 1992 for continued back pain. His medication at that time included Percocet, Prozac, Demerol, Soma, Dalmane, and Lomotil. An MRI was obtained in July 1992 (Figs. 3, A–C, and 4, A–C). This study showed a transitional vertebrae at the lumbosacral junction, with postsurgical changes at L_4–L_5 and L_5–S_1 consistent with left-sided laminectomy and left partial facetectomy with postsurgical fibrosis in the vertebral canal surrounding the thecal sac and the left-sided nerve roots. At L_4–L_5 there were degenerative changes along the endplates and the intervertebral discs with circumferential, diffuse disc bulging into the central canal and neural foramina, more pronounced on the right side (3–4 mm). There was a moderate degree of mass effect on the right-sided nerve root at this level.

The MUA procedure was brought to the attention of the patient by the neurosurgeon. He was felt to be at some increased anesthetic risk due to a history of advanced coronary artery disease. However, this risk was judged to be acceptable. The patient agreed to the procedure and it was carried out according to the protocol in the discussion section over 3 consecutive days. He also received physical therapy three times per day in the form of interferential current, ultrasound, heat, and massage.

Upon admission prior to the MUA the patient reported that his activity was restricted to lying supine most of the day and he was classified as totally disabled. He rated his pain level as 9+ (0–10 scale). SLR caused low back and bilateral radicular pain at 40 degrees on the right and 30 degrees on the left. Braggard's sign was positive on the right. Goldthwait's test was positive bilaterally at 30 degrees. There was palpatory evidence of muscle spasm on both sides of the thoracolumbar spine. Lumbar range of motion was markedly decreased with flexion limited to 10 degrees, extension 5 degrees, and lateral bending 5 degrees because of pain. He did not tolerate any rotation. Neurologic exam revealed hypoesthesia at the third, fourth, and fifth toes on the left. He was unable to toe walk on the right and had diminished Achilles and patellar reflexes bilaterally.

He had outpatient manipulation and physical therapy treatments for a month and had follow-up visits with the neurosurgeon. Thirty days post-MUA he reported a pain level of 3 (0–10 scale). SLR was negative at 80 degrees, with hamstring tightness limiting the test. Braggard's sign was negative. Neurologic examination revealed normal sensation and Achilles reflex. He was able to toe walk on right and left. Lumbar range of motion was 80% of normal.

Twelve months post-MUA, his pain level was reported as 3–4 on a scale of 0–10. Some stiffness had returned, but he was able to function with normal activities of daily living including swimming, scuba diving, and some martial arts. He underwent another coronary artery bypass surgery and has

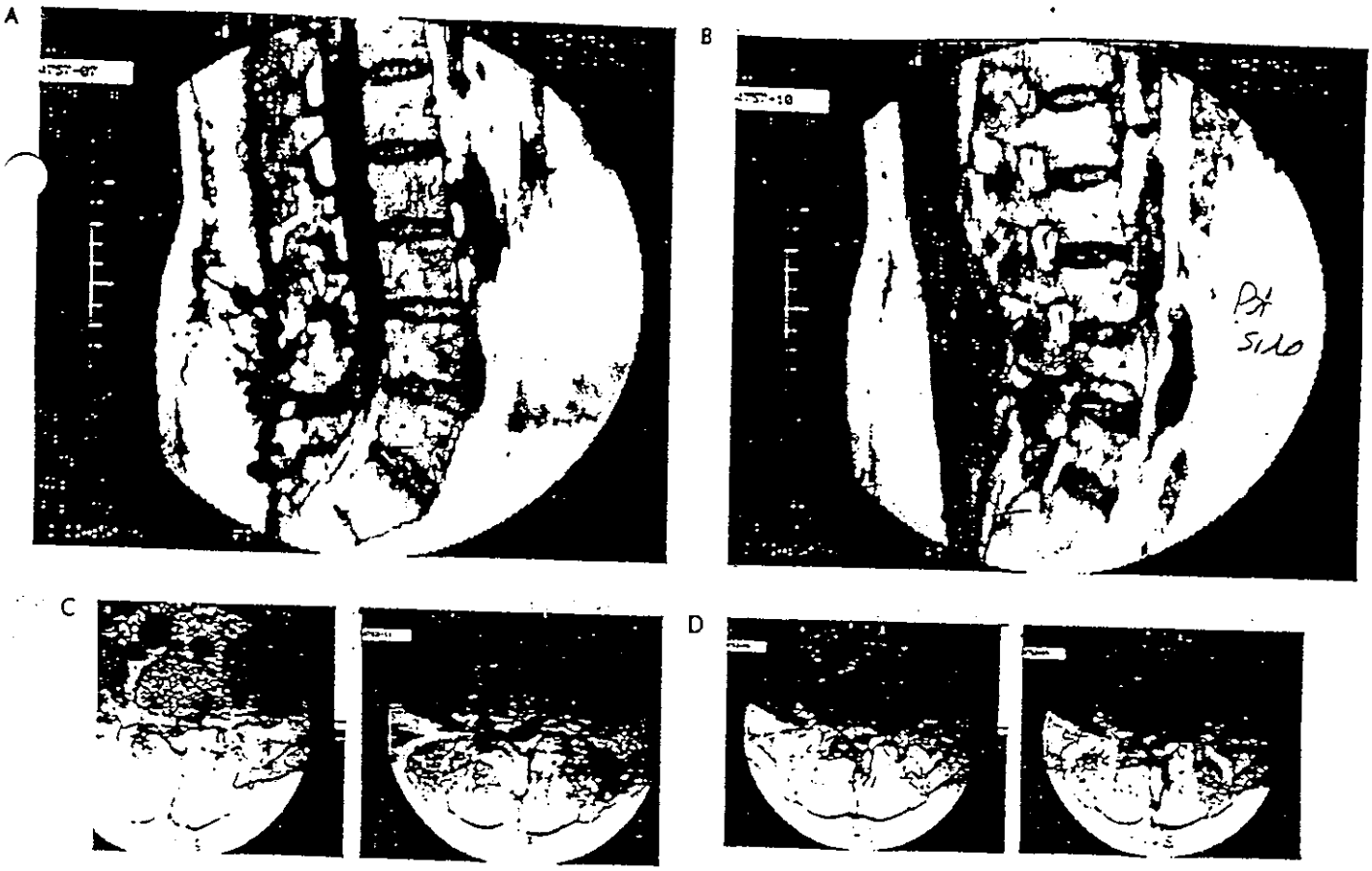

FIGURE 2. T_1-weighted MRI scan through the lumbar spine in December 1987. A, Midline sagittal image. B, Right-side parasagittal image. C, Axial image at L_4 disc level. D, Axial image at L_5 disc level. Note the presence of scar tissue with distortion of nerve roots, as well as degenerative changes and posterior protrusion of the L_4 and L_5 disc.

been unable to return to his work in law enforcement because of his cardiac status.

DISCUSSION

These two cases of back pain and disability following lumbar spine surgery were referred from a neurosurgeon to a chiropractor for the procedure of MUA. They had been refractory to other conservative treatments and surgical interventions. MUA was presented to the patient as an option for attempting to improve pain control and functioning. The procedure resulted in marked symptomatic improvement immediately after the MUA. Additionally, functional ability improved in these patients for whom physicians had expressed little hope of recovery of normal function.

Both of the patients described in the present study had a combination of low back and lower extremity pain. It is not clear that all of the lower extremity pain was radicular, given the fact that irritation of low back tissues may result in referred pain in the lower limbs (13,14). In a review of 1,293 cases of low back pain, Bernard and Kirkaldy-Willis (15) distinguished radicular from referred pain by examining for coexistent signs and symptoms. They related that referred pain syndromes occur nearly twice as often as radicular syndromes. However, given the findings on neurologic examination and well as the MRI, CT, and myelographic findings of fibrosis and scarring around nerve roots, it seems likely that a significant component of the lower limb pain was radicular in these patients. Of course, this does not discount the contribution of referred pain to the symptoms in these two patients.

Manipulation has a long history in treating pain syndromes of the low back. Over the past 2 decades, empirical methods have been applied to the assessment of effects of manipulation, and meta analysis of controlled studies of manipulation of the lumbar spine by Shekelle and colleagues (16) has reported significant benefit in acute back pain. Haldeman and Phillips (17) have described a number of indications for manipulation of the low back, including: uncomplicated low back pain (lumbago), sciatica without neurologic deficit, uncomplicated chronic low back pain, postsurgical low back pain, intervertebral disc degeneration, posterior facet syndrome, sacroiliac syndrome, sacroiliac strain, piriformis syndrome, psoas syndrome, spondylolisthesis, and spinal stenosis (central stenosis and lateral entrapment).

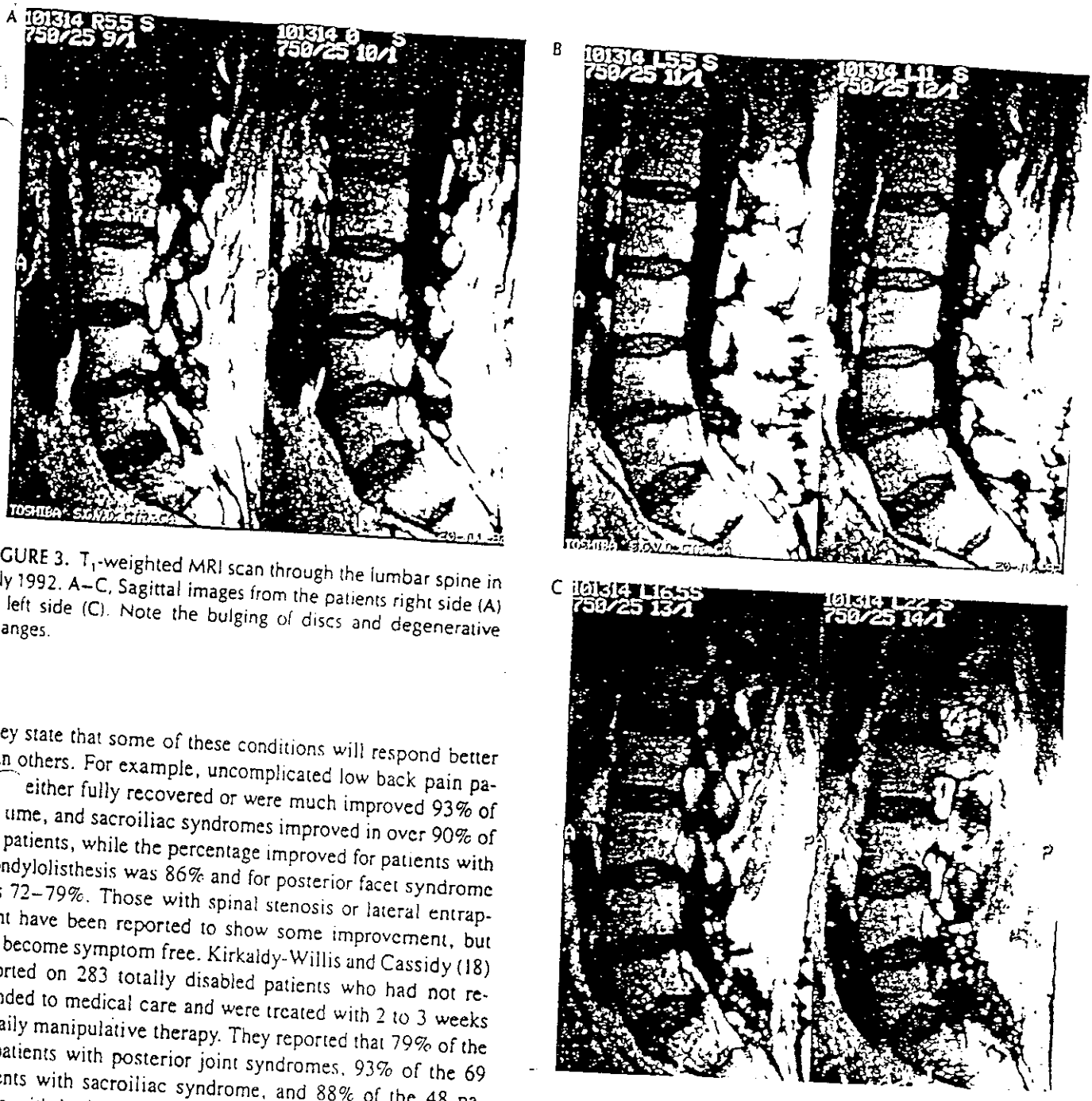

FIGURE 3. T_1-weighted MRI scan through the lumbar spine in July 1992. A–C, Sagittal images from the patients right side (A) to left side (C). Note the bulging of discs and degenerative changes.

They state that some of these conditions will respond better than others. For example, uncomplicated low back pain patients either fully recovered or were much improved 93% of the time, and sacroiliac syndromes improved in over 90% of the patients, while the percentage improved for patients with spondylolisthesis was 86% and for posterior facet syndrome was 72–79%. Those with spinal stenosis or lateral entrapment have been reported to show some improvement, but few become symptom free. Kirkaldy-Willis and Cassidy (18) reported on 283 totally disabled patients who had not responded to medical care and were treated with 2 to 3 weeks of daily manipulative therapy. They reported that 79% of the 54 patients with posterior joint syndromes, 93% of the 69 patients with sacroiliac syndrome, and 88% of the 48 patients with both syndromes had no restrictions for work or other activities following the manipulative treatment. On the other hand, of the 112 patients with other diagnoses, 36–50% recovered unrestricted work capacity. A 2-year study (19), supported by the British Medical Research Council, reported that chiropractic treatment was effective for patients with chronic or severe back pain and suggested including chiropractic in Britain's National Health Service. In the Utah Workers' Compensation study (20) of over 3,000 cases showed compensation costs were 10 times less under chiropractic care, and time off work under chiropractic care was seven times less. The AV MED HMO study (21) had 100 of its medically unresponsive patients sent for chiropractic treatment, and 86% were helped. Additionally, all 12 patients who had been assessed as requiring disc surgery were improved within 3 weeks of chiropractic manipulation.

There have been a number of hypotheses advanced to explain the beneficial effects of manipulation on patients with low back pain. These include meniscoid entrapment, displaced intervertebral disc fragments, segmental or intersegmental muscle spasm, and periarticular connective tissue adhesions (22). One feature common to all of the theories is reflex muscle spasm. Fibrous adhesions may be due to a pro-

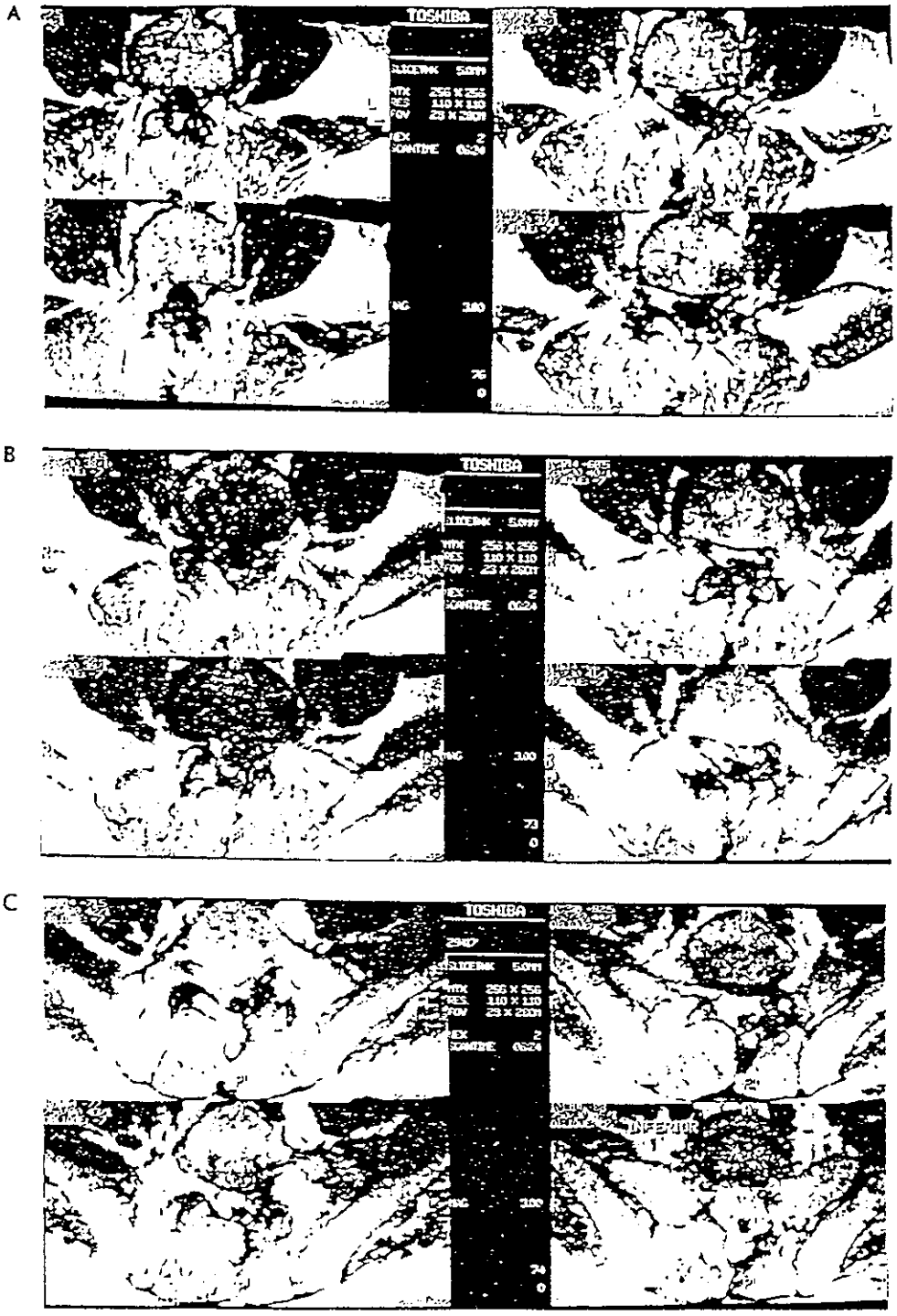

FIGURE 4. Axial T_1-weighted MRI scan through the lumbar spine in July 1992 (the same study as in Fig. 3). A, L_4 level showing fibrous scar in the left side of the vertebral canal with distortion of the thecal sac. B, L_4–L_5 level showing marked involvement of the left side of the vertebral canal adjacent to the laminectomy. C, L_5-S_1 level with continued fibrosis and distortion of the thecal sac.

cess of inflammation and repair resulting in an increased collagen content following injury or through collagen fibril cross-links through immobilization (23,24). The periarticular tissue changes that occur with immobilization include the lack of movement of the portion of the spine which will stimulate increased production of collagen fibril cross-links. The cross-links bind collagen fibers so that movement is restricted. When subjected to a high-velocity thrust, these cross-links may be disrupted without a resultant inflammatory reaction that would occur if the collagen fibers were torn (24).

There are various causes of recurrent sciatic nerve root irritation following lumbar surgery. Chief among these are recurrent or new HNP and the development of fibrous scar tissue entrapping or distorting the nerve root. Scar tissue may be a particularly difficult problem after lumbar spine surgery. The differentiation of postoperative fibrosis from disc protrusion is important because the results of reoperation for epidural fibrosis are not as successful as in recurrent disc protrusion. The use of gadolinium diethylenetriaminepentaacetic acid/dimeglumine (Gd-DTPA) prior to MRI allows the scar to be enhanced with the contrast dye, while herniated disc material does not similarly enhance. Hueftle showed that contrast in T_1-weighted MRI studies is highly accurate in separating epidural fibrosis from herniated disc (25).

The two patients in this case report had prolonged symptoms, and each had a number of back surgeries with radiographically identified postoperative scarring. There were restrictions of motion which were probably both muscular and fibrotic in nature. In this regard, these patients would appear to have been appropriate for MUA. The MUA procedure in these cases have had longer lasting results than previous surgeries, nerve blocks, or medications.

Indications for MUA

The principal reported indication for MUA is failure to respond to other treatments along with a high likelihood of a lesion which would be expected to respond to MUA. The duration of conservative therapy that has been suggested in the literature prior to consideration of MUA ranges from 1 to 8 weeks (1–6,26). Conditions of the lumbar spine that have been reported to respond well to this procedure include nerve entrapment, chronic myositis, chronic fibrositis, restricted motion following trauma, chronic muscle contracture, and occasionally acute muscle spasm associated with subluxation (5,6). Additionally, acute or chronic cervical, cervicobrachial, and cervicocranial syndrome nonresponsive to conservative management have been reported as an indication (2).

Reports of manipulation under anesthesia have gone back as far as 1930 when Riches (26) reported successful treatment of 87% of his patients with chronic sciatica, and 92% with chronic sacroiliac strain with manipulation under anesthesia. Chrisman (27), Mensor (28), and Wilson (29) reported disc herniations, proven myleographically and clinically and not responsive to other conservative measures, achieved good or excellent results after rotatory MUA of the spine in 50% of cases. In a randomized clinical trial on patients with electromyographic findings of nerve root compression, 50% showed some improvement following MUA (5).

Siehl (4) described 723 cases in which he evaluated results from MUA. MUA was performed two or more times on the same patient in 57 cases. Laminectomy had been performed subsequent to MUA in 45 cases. Of the patients having a herniated nucleus pulposus, 70.7% were improved. In many of these cases the improvement was temporary, since 51% did have a subsequent operation. With the patients having a diagnosis of myofibrositis (or similar condition), 96.3% improved. Associated pathologic states other than herniated nucleus pulposus did not influence his results.

Contraindications

A number of contraindications have been reported to MUA. In most respects these are similar to the contraindications to manipulation itself. These include malignancies of the spinal cord or vertebral column, tuberculosis of the bone, joint instability, acute inflammatory joint disease, bone or joint infection, acute fractures, unstable fractures, anticoagulant therapy, cord compression by tumor, acute gout, congenital bleeding disorders, or cauda equina compression. Relative contraindications are osteoporosis, hypertrophic spondyloarthrosis, neurologic deficit of the lower extremity, and herniation of the nucleus pulposus with an extruded free fragment. In the cervical spine, additional contraindications would include long-tract spinal cord signs, rheumatoid arthritis, and Down syndrome. Relative contraindications additionally would be upper extremity neurologic deficit, carotid and/or vertebral artery disease, and advanced spondylosis and spondyloarthrosis. (2,3,17). Less than 1% of all low back pain patients have an underlying systemic disease as a cause (30). Complications to the lumbar spine are rare and mostly consist of exacerbation of radiculopathy with a herniated disc (31).

Procedure

Most frequently the MUA procedure consists of a single treatment employing predominantly long lever techniques (2,4,6,28). General anesthesia is usually employed, particularly in regions other than the lumbar spine, while some reports have described caudal analgesia with manipulations in the low back (32,33). The anesthetic used in the two cases in this report was a combination of nitrous oxide, sodium pentathol or Versed, Diprivan, and Anectine.

Manipulation under anesthesia includes mobilization, ma-

nipulation with high- and low-amplitude thrust forces, long-axis distraction, and stretching techniques. The general procedure is outlined here, while the procedure is frequently individualized. The purpose of this procedure is to stretch adhesive soft tissue and restore joint function. Types of manipulative force used may include high-velocity, low-amplitude thrust after removal of all the slack with localization of the vectors of force at the particular point of joint restriction. The resultant movement overcomes the restriction and disrupts adhesions. Other maneuvers employ low-velocity, high-amplitude stretching, during which a joint is moved through its full range of motion, thus stretching periarticular tissues that may be contributing to limitations of motion (6). The more carefully the vectors of force are applied, the less force it takes to overcome the restriction and produce normal motion. This also decreases the likelihood of producing trauma. Many of the techniques require at least two operators, since control of the weight of the patient's body and of the extremities rests entirely with the operators when the patient is under general anesthesia. This is particularly important with treatment directed at the lumbar spine and pelvis.

The technique as applied in these cases began with the patient supine, with passive stretching of the right lower extremity carried out first with the knee individually brought up to the chest, first to midline, then at 45-degree angles medial and lateral, then repeated on the left. Both knees were maximally flexed at the hips with the knees brought up to the chest with subsequent rotation of 30 degrees to the right and left. External and internal circumduction of the hip was then performed twice on the right, then twice on the left. Straight-leg raising was accomplished to 90 degrees on each side. This primarily stretched the sciatic nerve and spinal nerve roots at the L_5, S_1, and S_2 levels. The patient was then turned on the left side with the right knee and hip flexed, and the upper torso was rotated with the lumbar lordosis reduced. The segment to be manipulated was localized and when the elastic barrier of resistance was identified, a combination of low-velocity and high-velocity short-lever thrusts were applied. Cavitation at several segments was generally achieved. The procedure was then repeated with the patient on the left side. The dorsal spine was mobilized by extension technique in which the patient's arms were crossed on the chest with each hand on the contralateral shoulder. The operator placed one hand under the segment to be moved and the other hand on the patient's elbows with thrusts dorsally and cranially.

The assistant operator is needed for the positioning and stabilization of the patient and to assist in manipulations. The techniques used are similar to those used in routine outpatient manipulative treatment except that less force is applied in the MUA. However, one must remember that with the patient under anesthesia, the tactile feeling of joint play and resistance is completely different and that the operators are supporting the joints. Care must be taken not to manipulate too vigorously under anesthesia. Instead of trying to achieve full range of motion in one manipulation, it is often better to manipulate more gently on two or more occasions (34). Most of the forces applied are a combination of traction, some rotation, and possible side bending with the velocity and amplitude selected for the patient's condition (6). The use of high-velocity, low-amplitude forces is for breaking up adhesions. Long-axis distraction and stretching techniques are for stretching periarticular tissues. Mennell (35) has stated than it is no more irrational to use anesthesia to provide relaxation and to avoid pain in joint manipulation than it is to use anesthesia for the reduction of fractures and dislocation or extracting a tooth.

Postoperative Care and Outcomes of Treatment

Adverse effects during or after the procedure may include those of general anesthesia, such as drop in blood pressure, dysrhythmia, respiratory distress, or cardiac arrest. Complications of the manipulative procedure include fracture of ribs, disc herniation, dislocation, neurologic deficit, or paralysis. With these possible adverse reactions, cases must be carefully selected (3). Success is directly related to the skill of the anesthesiologist and the quality of the operator's manipulative skill (4,6). After these manipulative procedures, follow-up care often consisting of medications and outpatient therapy for 1 month is generally necessary. Ongoing home stretching and strengthening exercises should be continued indefinitely. Both of the patients in this present report were advised to continue with daily home stretching techniques following active manual medicine care. In both of these patients some pain and stiffness had returned over a period of 6 to 12 months following MUA. However, their symptoms were far better than those prior to the course of treatment. Both patients also regarded their functional capacity as being much improved. A current shortage of controlled studies documenting the effects of MUA should not prevent the safe application of MUA with selected patients who have responded poorly to other therapeutic measures.

CONCLUSION

Recurrent herniated disc and symptomatic hypertrophic scar can produce similar low back symptoms and radiculopathy. Epidural adhesions, which are most often recognized in patients following prior lumbar surgery, may play a role in low back pain or sciatica in some patients that have not had surgery (36). Primary epidural adhesions in the epidural space may explain the chronicity of some back pain and sciatica, and why surgery should be avoided in patients whose imaging studies are negative for nerve root compression (36).

The MUAs performed in this present study were a collaborative effort of a group of professionals including nurses,

physical therapists, anesthesiologists, a neurosurgeon, and chiropractors in treating patients in which all other care had failed. It has been reported by Trief (37) that of the 200,000 back surgeries done in the United States annually, 30% fail to relieve any pain, and at a 5-year follow-up only 10% of the remainder have provided satisfactory relief. Burton (38) earlier reported that long-term failure rates of back surgery have been reported from 10% to 40%. White (39) reported 20–40% of the patients will fail to gain the desired surgical results and about 10% will be worse after the initial surgery. Given these data, the number of persons with failed back surgery syndrome characterized by intractable pain and functional incapacitation must be significant. With patients who have undergone surgery only to have the pain return due to scar tissue and fibrosis, MUA may be beneficial. Additional studies of MUA are needed in long-term follow-up and to show if this procedure may be an alternative to surgery in disc cases.

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