Manipulation under anesthesia for patients with failed back surgery: retrospective report of 3 cases with 1-year follow-up

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Abstract

Objective: This report describes the treatment of 3 patients with previous spinal fusion surgery who had subsequently regressed to their previous levels of pain and disability.

Clinical Features: Three patients with chronic intractable pain presented to a private integrative medicine clinic for manipulation under anesthesia (MUA) evaluation. All 3 patients had previously had lumbar spine fusion surgery for intervertebral disk herniation. All surgeries were performed at least 2 years before clinical presentation. Patients had plateaued with other conservative pain management strategies before seeking MUA treatment.

Intervention and Outcomes: The patients were evaluated for MUA. The patients received a serial MUA over 3 consecutive days by trained chiropractic and osteopathic physicians. Outcome assessments used for each patient included a quadruple numerical pain rating scale and functional rating index. Patients completed a course of post-MUA physiotherapy and rehabilitation lasting 8 weeks immediately after the serial MUA. Clinical improvements were observed in all 3 outcome assessments after the MUA, the post-MUA therapy, and were essentially maintained 1 year after conclusion of treatment.

Conclusion: Three patients with failed back surgery were treated conservatively using MUA by trained chiropractic and osteopathic physicians followed by 8 weeks of post-MUA therapy. Pain and disability outcomes all improved immediately following treatment.

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Introduction

Manipulation under anesthesia (MUA) is an outpatient surgical procedure that is performed to increase articular motion and reduce chronic pain. Spinal MUA

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has been studied as far back as 1952, when Siehl and Bradford¹ reported results of 87 patients treated for lumbar disk herniation. The 2002 review by Kohlbeck and Haldeman² identified nearly 1800 published cases of MUA for chronic spinal pain syndromes. The majority of these cases reported at least a good outcome.

Failed back surgery syndrome is a growing concern in the United States. It is defined as “a condition where after lumbar surgery the patient is not: physically comfortable without regular medication or treatment, is not economically productive if they so desire, and is not able to undertake reasonable family, sporting, and recreational activities.”³ Several etiologies for failed back surgery syndrome have been suggested, including epidural fibrosis, canal stenosis, sacroiliac joint syndrome, facet syndrome, spondylolisthesis, and recurrent disk prolapse.⁴

Although there are many studies on MUA, only one reported on outcomes following previous surgical intervention and failed back surgery syndrome.⁵ The purpose of this study is to report on the outcomes of 3 patients who had been diagnosed with failed back surgery syndrome and chose to receive a serial MUA procedure. Outcomes were collected before, immediately following the MUA, and at 1-year follow-up.

Case report

Three patient files were selected for this report. All 3 patients completed a pre-MUA workup, received a 3-day serial MUA, finished the post-MUA therapy, and followed up approximately 12 months later. All 3 patients had a surgical history of lumbar spinal fusion surgery; 2 of them had an L5 discectomy, and the third had an L4 discectomy. Before writing this report, all 3 patients signed HIPPA-approved consent forms to publish the information in their files.

Patient 1, a 51-year-old male firefighter, had an L5 discectomy for a diagnosis of left lumbar radiculopathy secondary to L5 left posterolateral herniation. The patient's surgery was performed after unsuccessfully trying several conservative therapies, including yoga, chiropractic manipulation (6 visits in 2 weeks), physical therapy (12 visits in 4 weeks), and 3 epidural injections within 1 year. Before the surgery, the patient was taking Vicodin ES 7.5 mg/750 mg twice a day to help manage his pain level. According to the patient, he felt 90% better the day after the surgery and maintained that improvement for about 90 days total. At that time, the lower extremity paresthesia had

returned in his left first digit and lateral calf, which progressed to a return of the original pain in his left posterior thigh and lateral calf. The patient reported to our clinic approximately 2 years and 5 months after the surgery. He had returned to taking prescription pain medication, hydrocodone 5/500 mg, to maintain his usual daily home and work activities.

Patient 2, a 47-year-old female accountant, received an L5 discectomy about 3 years and 1 month before reporting to our office. She had been experiencing bilateral lower extremity numbness and pain in the first digit and the medial aspect of the dorsum of the foot bilaterally. Magnetic resonance imaging (MRI) demonstrated a central disk herniation at L5. This patient had received a 20% improvement (in her words) from physical therapy (24 visits in 8 weeks), but the improvement did not last beyond 2 weeks thereafter. She also had an epidural injection 12 months postsurgery, after which the patient's symptoms were increased. At the time of clinic presentation to us, she had been taking Vicodin 500 mg twice daily for her pain level. Her pain returned to its original quality and severity about 8 months after the surgery.

Patient 3 was a 64-year-old male construction worker who had an L4 discectomy 2 years and 2 months before presenting at our office. He had this surgery because of a worksite accident in which he was team-lifting a heavy object and a coworker slipped and let go of the object, forcing him to bear the weight of the entire object momentarily. At the time, he stated that he felt something “pop” in his back, but did not experience any pain until he woke up the next morning and could not get out of bed. An MRI study taken at the emergency department showed an L4 right posterolateral herniation with effacement of the right nerve root. Because of the traumatic nature of his complaint, surgery was sought as a first option. This patient did not experience any relief following the surgery. After completing 4 weeks of postsurgical therapy, the patient followed up with the attending neurosurgeon, who recommended fusing the L5 disk as well. At that point, the patient refused. The patient received several weeks of chiropractic manipulation, spinal decompression therapy, and 2 epidural injections. All of these treatments helped temporarily, according to the patient.

All 3 patients were diagnosed with failed back surgery syndrome by the author (MNS) based upon the definition above. Once this diagnosis was made in each case, a plan was created for each patient to begin the following process of clearing the patient for MUA clinically. Because previous MRIs had ruled out

sequestration in all 3 cases, all patients were referred for preanesthesia testing. To determine if the patients were suitable candidates for intravenous anesthesia, they were referred for the following standard preanesthesia testing: a Chem 18 panel, including prothrombin, partial thromboplastin time, and the international normalized ratio, and a chest radiograph. Lateral and anteroposterior lumbar radiographs were also ordered of each patient to visualize the areas of fusion. All 3 patients completed a quadruple numerical pain rating scale (QNPRS)⁶ and a functional rating index (FRI)⁷ before the MUA.

Intervention and outcome

Once MUA candidacy was approved, the patients were scheduled for a serial MUA over 3 days. The procedures were administered at an outpatient ambulatory surgical center. Patients were given Robinul (Shionogi Pharma Inc, Atlanta, GA) intravenously to decrease oral secretions and Toradol (Allergan, Irvine, CA) to minimize postprocedural discomfort. Once the anesthesiologist was ready, the patient was taken to the surgical suite where she assisted the patients into a deep conscious sedation using propofol. The patients were not responsive during the MUA. The MUA techniques were provided by trained chiropractic and osteopathic physicians in MUA. These techniques consisted of a combination of passive stretching and low-velocity/moderate-amplitude manipulative techniques for treating articular dysfunction. These techniques are modified to accommodate varying body types, conditions, as well as anatomical variations. These modifications are essential to prevent joint damage, ligamentous instability, and/or neurological compromise. Passive stretching was combined with distraction to increase range of motion while decreasing fibroadhesions. Passive stretching was performed to each joint's elastic end range of motion and held there for approximately 15 to 20 seconds. Muscular trigger points were treated with percussive techniques or myofascial release techniques at the time of passive stretching to overcome any muscular resistance.

After the stretches, low-velocity/moderate-amplitude articular manipulation was delivered to dysfunctional spinopelvic segments. For these patients, MUA techniques were performed on the lumbar spine, pelvis, and hip joints bilaterally. These techniques are illustrated by Gordon.⁸ The joints chosen for each patient were based upon multiple factors: (1) previous-

ly fused segments where fibroadhesions were likely to occur; (2) segments adjacent to fused segments, as arthrodesis promotes accelerated degeneration of adjacent levels⁹; and (3) joints observed to compensate due to chronic pain (ie, hip joints due to chronically antalgic posture) through range of motion evaluation.

Following the conclusion of the MUA, each patient was taken to the recovery area and was discharged for the day. Patients were instructed to report back for days 2 and 3 of the serial MUA. Before days 2 and 3 of the MUA, patients were assessed to document subjective and objective improvements following the first MUA procedure. Subsequent MUAs are not administered if (1) functional or subjective improvements are not observed or (2) the patient reports a 70% or greater subjective or functional improvement.⁸ The MUA procedures were repeated on both days 2 and three. Upon discharge on the third day, the author (MNS) prescribed 600 mg ibuprofen every 6 hours to mitigate the reformation of fibroadhesions around the affected joint structures. Both authors took part in the MUA for all 3 patients. Each performed approximately 50% of the manipulative techniques, while the other simultaneously stabilized the non-responsive patients.

As patients completed their third and final MUA, they were prescribed 8 weeks of post-MUA rehabilitation therapy. This therapy was prescribed for 3 visits weekly for 8 weeks. The first week of therapy consisted primarily of passive procedures to maintain soft tissue mobility, such as massage therapy, light assisted stretching, and intersegmental traction, as well as cryotherapy to complement the 600 mg ibuprofen. Over the subsequent weeks of therapy, the patients progressed to active care protocols with emphasis on activities of daily living. The active care protocols used for these patients have been illustrated by Gordon.⁸

After 8 weeks of post-MUA therapy, the patients again completed a QNPRS and an FRI. Table 1 summarizes each patient's scores on the QNPRS and the FRI. Upon release from therapy, patients were

Table 1 Patient scores

	QNPRS 1	QNPRS 2	QNPRS 3	FRI 1	FRI 2	FRI 3
Patient 1	77	60	53	31	22	22
Patient 2	67	47	43	26	17	18
Patient 3	53	33	27	19	11	7

QNPRS 1 and FRI 1 = baseline assessments. QNPRS 2 and FRI 2 = 8 weeks after MUA; end of post-MUA therapy. QNPRS 3 and FRI 3 = 1-year follow-up.

instructed on specific home care exercises that had been previously performed in the clinic setting. All patients were instructed to follow up at 6-month intervals to monitor progress. At each follow-up, each patient again filled out the outcomes questionnaires. For all outcomes, all patients obtained clinically significant improvements within the context of the outcome questionnaires. No adverse events were reported for any patient, and the improved outcome scores were maintained during the 1-year follow-up.

Discussion

This report differs from the previous failed back surgery report by Aspegren et al⁵ in that we used an intravenous route of anesthesia administration compared with their report in which they used epidural anesthesia. A disadvantage in using epidural anesthesia is the complications that may arise as a result of this route of administration, including postdural puncture headache¹⁰ and increased postprocedural pain.¹¹ Shafiq et al¹² reported an overall complication rate of 26.6%, including motor block, dural tap, ineffective pain control, accidental catheter pullouts, and problems associated with the delivery system of the drug. In addition to the mode of anesthesia, the follow-up in our report was much longer than that of Aspegren et al. Their study reported only a follow-up of 45 days after the post-MUA therapy was complete,⁵ whereas ours included pain and disability scores 12 months after post-MUA therapy.

The improvements reported by each patient in this report suggest that the MUA procedure may have a lasting impact on the function of the intervertebral disk and/or the flexibility of spinal joints. There are multiple possible explanations for this. In our opinion, MUA has a greater impact on intervertebral disk function than clinical care because of the effect of anesthesia on mitigating pain limits and muscular guarding. According to DePalma and Rothman,¹³ intervertebral disks begin to deteriorate because of lack of motion, which is vital to maintain exchange of metabolic waste and oxygenation. When this ceases, the disk begins to deteriorate. Therefore, the MUA procedure may be responsible for reintroducing motion to the degenerated spinal disk and allow this nutrient exchange to again take place. However, this ability to mobilize a degenerative, painful intervertebral disk in the clinic setting is difficult at best, giving MUA an advantage over usual clinic treatment.

Another possible explanation for our patients' observed improvements is that the MUA procedure reversed the abnormal joint mobility caused by chronic postural adaptation. When patients have chronic spine and/or disk pain, they tend to develop compensatory postural habits and locomotion patterns to minimize their pain levels.¹⁴⁻¹⁷ When patients have spinal fusion surgery to correct the initial origin of the chronic pain (ie, nerve root compression, spinal cord effacement), they still maintain these abnormal gait and postural adaptations.¹⁸ These adaptations may then themselves promote chronic pain patterns and also promote accelerated degeneration of spinal motion segments adjacent to the surgery sites by increasing the gravitational stress upon them.¹⁹ The MUA procedure may then be appropriate to address these postural adaptations by improving joint mobility in those joints taking part in the postural adaptive response.

All 3 patients in this study had a surgical history of lumbar spinal fusion. It is unknown how or why these patients did not receive a significant, sustained therapeutic benefit from the surgery. However, it is known that surgery can create fibroadhesions that may restrict future mobility once healed. The main hypothesis as to why MUA works is that it allows the clinician to take restricted joints (due to these fibroadhesions) through their normal, complete ranges of motion. However, pain and/or fibroadhesions prevent this full mobility from taking place in an awake state. During the MUA, the act of taking these joints through their full ranges of motion may release these fibroadhesions, at which point mobility may be increased on a fairly immediate basis.

Because all 3 patients were nonresponsive and, thus, their protective reflexes were inhibited, we used low-velocity manipulative techniques to achieve joint cavitation. Unlike the clinical setting where the patient is awake and responsive, patients under intravenous anesthesia do not experience muscle guarding and pain limitations like they do in the clinic setting. Therefore, it is not necessary to use the same velocity of force during MUA as it is in the clinic setting. In addition, MUA manipulative techniques are preceded by prolonged stretching of the joints and their muscles, thus minimizing restriction before manipulative techniques are administered.

The outcomes instruments used for these patients were chosen because they give indications of both pain improvements as well as daily function improvements. The QNPRS⁶ asks patients to visually rate their pain "right now," "on average," "at its best," and "at its worst." The questionnaire contains a formula by which

to score the test. A score of 50 is the median above which the pain is considered high intensity and below which it is considered mild pain. The FRI is a 10-question hybrid combination of the Neck Disability Index and the Oswestry Back Pain Index.⁷ It provides clinicians a means of quickly rating daily function in patients, allowing the clinician to use the same questionnaire regardless of chief complaint.

The MUA procedure in totality also includes the post-MUA therapy. This therapy is considered essential to prevent the reformation of fibroadhesions, as well as to begin training for activities of daily living and flexibility so that the gains made during the serial MUA are maintained.⁸ However, because the patients completed both the MUA and the therapy, it is unknown which of these had a greater impact on the reported outcomes. Although it is unlikely that the patients' symptoms would have improved on their own with time, the present study design cannot rule out that possibility. All 3 patients were deteriorating at the time of their initial presentation to our office rather than improving.

Patients were instructed to perform certain basic exercises upon their release from care. However, because a home journal was not issued to any of the patients, we do not know how compliant the patients were with our instructions. Providing a journal to patients in the future will help us determine if a lack of compliance affects the level of results.

It is unknown exactly how MUA may have impacted these patients' spines at a tissue level because no studies to date have actually evaluated the ability of MUA to break up fibroadhesions. Knowing this information in the future will help improve patient selection for MUA because, currently, there is no clear-cut consensus on which conditions are appropriate for MUA.²

Limitations

Because this report is a case series, there are several inherent limitations. Firstly, being a retrospective design, there is inherent bias in patient selection. Secondly, the lack of a control group does not exclude the chance of placebo effect. The small sample size and lack of a control prohibit us from drawing any conclusions about the ability of MUA to help patients with failed back surgery. Finally, because the mechanisms that explain the clinical success of MUA are not entirely understood, we cannot provide specific

information as to which particular treated joint or joints in each patient provided the observed and self-rated clinical improvements. Research into the MUA procedure should direct some effort into understanding how MUA achieves its historical clinical success with more objective evidence, such as before and after imaging studies.

Conclusion

Manipulation under anesthesia was administered without incident to 3 patients with a diagnosis of failed back surgery. Following the MUA procedures, all 3 patients reported clinically significant improvements in pain and disability levels. These results were essentially maintained at 1-year follow-up for all 3 patients.

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