

## Manipulation with the patient under anesthesia

PHILIP E. GREENMAN, DO

Manipulation while the patient is under anesthesia is an old, widely recognized procedure in musculoskeletal medicine. It is used for treating acute and chronic musculoskeletal conditions with significant biomechanical dysfunction unresponsive to conservative therapy. The procedure is helpful when muscle spasm and irritability preclude success without anesthetization of the patient. Safety and effectiveness are favored by appropriate selection of patients, knowledge of indications and contraindications, suitable anesthetic, and services of a qualified physician trained in structural diagnosis and manipulative technique. A team approach is recommended. To illustrate effective use of the procedure, a classic case is described.

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Mobilization of the musculoskeletal system with the patient under anesthesia has been part of the armamentarium of manual medicine for more than 60 years. This procedure has been applied to the spine, particularly in the lumbosacral and cervical regions, as well as peripheral joints. With the development of manual medicine procedures that use intrinsic activating forces and inherent mobility, the

need to perform mobilization with impulse (that is, high-velocity, low-amplitude thrust technique) with the patient under anesthesia has been less frequent.

Manipulation while the patient is under anesthesia should be performed for specific indications in a patient who has been evaluated adequately. Appropriate concern must be given to contraindications, skill of the anesthesiologist, and the competence of the manipulating physician. The following case illustrates the appropriate use of this procedure.

### Report of case

A 28-year-old woman was first seen in consultation 4 days after admission for a chief complaint of painful stiffness of the cervical spine, intractable nausea, and multiple episodes of vomiting for the preceding 5 days. Initial hospital care had consisted of intravenous hydration and pain control with diazepam (Valium), 5 mg to 10 mg every 4 hours; hydrochloride meperidine (Demerol), 50 mg every 4 hours as needed for pain; and promethazine hydrochloride (Phenergan) as needed for control of nausea. The complaint had begun 4 weeks before admission when the patient experienced acute neck pain after an incident in which, while lying in the prone position, she lifted her head from the left rotated position and turned suddenly to the right. Onset of pain, stiffness, and muscle spasm was immediate. The pain was located to the right upper cervical and midcervical area with radiation to the right scapular and upper thoracic region and to the posterior aspect of the upper arm. Initial studies included x-ray films of the cervical spine

Dr Greenman is professor, Department of Biomechanics, Michigan State University, College of Osteopathic Medicine, East Lansing, Mich.

Reprint requests to Philip E. Greenman, DO, Department of Biomechanics, Michigan State University, College of Osteopathic Medicine, East Lansing, MI 48824-1315.

and cervical myelography, the results of which were reported to be normal. Magnetic resonance images of the cervical spine 3 days before admission also were interpreted as showing no abnormality. Conservative care, including cervical traction and physical therapy modalities, had been ineffective.

Physical examination revealed considerable restriction of cervical motion, both active and passive ranges, in the directions of extension, right sidebending, and right rotation. Moderately severe deep muscle spasm overlay the right posterior cervical region, particularly C4-C6. Segmental mobility was restricted at C4, C5, and C6 in the directions of backward bending, right sidebending, and right rotation. Respiratory mobility of the right upper rib cage was restricted with tenderness at the rib angles on the right side at T2, T3, and T4 with palpable spasticity of the iliocostal insertions. All deep tendon reflexes were intact. There was no significant sensory loss. No motor weakness was present except for loss of effort of right shoulder elevation because of pain.

Additional conservative care was given, including manual medicine of the functional (balance and hold) and muscle-energy type and trigger-point injection in the regions of muscle irritability. Despite all conservative measures, however, the patient's condition was nonresponsive.

Further evaluation was made by dynamic flexion extension studies of the cervical spine in the lateral projection. This study revealed marked restriction of motion in both flexion and extension of C3, C4, C5, and C6.

At surgery, with the patient under general anesthesia, mobilization with impulse was provided to the thoracic spine and right rib cage for the restoration of neutral mechanics. The cervical spine was mobilized with impulse segment by segment on both the right and left side. The patient tolerated the procedure well. The patient was discharged 24 hours later with greatly improved cervical mobility and reduction in pain with no further nausea or vomiting. She was treated for 2 weeks with progressive, increasing-resistance physical therapy exercises, and with manual medicine of the muscle-energy type.

The patient was symptom-free for the succeeding 18 months, when she was seen again for mild, recurrent, painful cervical stiffness to right rotation. Minimal restriction was found in C4, C5, and C6 on the right in a pattern similar to that seen originally. This problem responded completely to a 10-day course of manual medicine of the muscle-energy type. She is currently symptom-free.

### Discussion

This case demonstrates the role of mobilization with the patient under anesthesia. This patient sustained an acute episode of dysfunction of the cervical spine resulting in considerable disability. Other organic causes for her symptom complex were excluded by comprehensive evaluation. She was unresponsive to multiple forms of conservative therapy including manual medicine procedures that involved inherent force and intrinsic activating force. The patient's condition was greatly improved 24 hours after undergoing manipulation under anesthesia, and she was symptom-free within 10 days. No subsequent sequelae occurred for 18 months. Minor recurrence then responded quickly to more usual forms of manual medicine.

### Criteria

Physicians have extensively used manipulation with the patient under anesthesia for the treatment of acute and chronic musculoskeletal conditions with evidence of biomechanical dysfunction as a significant component. It has been found useful in patients with acute and chronic muscle spasm, shortening, and contracture. The procedure requires appropriate patient selection, knowledge of indications and contraindications, appropriate general anesthesia, and the services of a well-qualified physician trained in structural diagnosis and manual medicine technique.

### Indications

Manipulation with the patient under anesthesia is useful in chronic vertebral somatic dysfunction unresponsive to conservative management. The procedure is also helpful in acute vertebral dysfunction that cannot be controlled

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by conservative means, with muscle spasm and irritability that preclude success with manual medicine procedures without anesthesia. Chronic myofibrositis of a nonrheumatic nature<sup>1,2</sup> that has been nonresponsive to conservative care is also aided by this procedure. Manipulation with the patient under anesthesia can be used to enhance recovery from a wide variety of acute and chronic functional musculoskeletal disorders.

Perhaps the greatest indication for this procedure is the inability of a skilled manual medicine practitioner to achieve maximal function of the dysfunctional regions by other forms of manual medicine. The need for manipulation with the patient under anesthesia is not common. Morey<sup>3</sup> reported that only 3% of hospitalized patients with musculoskeletal disorders in a 3-year period required this procedure.

### *Contraindications*

Contraindications can be viewed as absolute and relative. Most authors agree that absolute contraindications include joint hypermobility or instability. Malignant disease, either primary or secondary, of the spinal cord or vertebral column also precludes this procedure.<sup>4</sup> Acute inflammatory joint disease and bone or joint infection are further contraindications. Obviously, no patient with a fracture of the vertebral column should undergo manipulation while under anesthesia. Organic neuropathies, particularly those associated with diabetes, should also preclude use of this procedure.

Relative contraindications are osteoporosis, in which considerable care in the procedure must be recognized, as well as herniation of the nucleus pulposus of an intervertebral disk, particularly with an extruded free fragment. Some authors report some improvement in the presence of known intervertebral disk disease, but this has been shown to be temporary in nature.<sup>5-8</sup>

### *Preoperative evaluation*

A comprehensive history and physical examination is required with particular attention to ruling out any potential contraindication and to identify the significant somatic dysfunction

pattern that has been nonresponsive to other manual medicine procedures. Laboratory evaluation should be sufficient to rule out contraindications and assure the ability of the patient to undergo general anesthesia. X-ray examination of all the spinal regions to be manipulated is necessary, not only to rule out organic disease and other contraindications, but also to demonstrate the anatomic features present. Dynamic studies of flexion and extension in the lateral projection as well as lateral bending x-ray films in the anteroposterior projection are useful in confirming the regions and directions of motion restriction. Many authors<sup>2,9</sup> also strongly advocate the inclusion of anteroposterior and lateral projections of the lumbar spine with the patient in the erect position for postural study. If significant short leg and pelvic obliquity with sacral base unleveling are identified, the use of lift therapy may be considered.

### *Type of anesthesia*

The purpose of the anesthesia is to obliterate the pain and muscle spasm that has prevented other forms of conservative manual medicine care from being effective. Some authors have used caudal analgesia,<sup>10,11</sup> whereas most others have recommended general anesthesia.<sup>1,3,5,12-15</sup> One benefit of a regional procedure, such as caudal analgesia, is that the patient remains awake and can be cooperative, while the muscle spasm is obliterated and the pain is relieved. Most often, general anesthesia is required, particularly in regions other than the lumbar spine. It must be emphasized that administration of general anesthesia is a hospital procedure only and should be performed by a competent anesthesiologist.

### *Operative procedure*

Manipulation with the patient under anesthesia usually includes mobilization by direct action with and without impulse in the areas of motion loss. Mobilization without impulse of the articular type is frequently sufficient in the absence of significant capsular and pericapsular adhesions. Mobilization with impulse (high-velocity, low-amplitude thrust technique) is frequently necessary, particularly in

**Table 1**  
**Special Considerations for Use of**  
**Manipulative Treatment**  
**With Patient Under Anesthesia:**  
**Cervical Spine**

**Indications**

- Acute or chronic cervical, cervicobrachial, and cervicocranial syndromes nonresponsive to conservative management
- Somatic dysfunction considered to be a significant component in the foregoing syndromes

**Contraindications**

*Absolute*

- Hypermobility/instability
- Evidence of myelopathy (long tract spinal cord signs)
- Rheumatoid arthritis
- Down's syndrome

*Relative*

- Upper extremity neurologic deficit
- Carotid and/or vertebral artery disease (atresia or atherosclerosis)
- Advanced spondylosis and spondylarthrosis

**Preoperative evaluation**

- X-ray studies of cervical spine including flexion/extension lateral, open mouth, anteroposterior, and both oblique projections
- Complete neurologic physical examination
- Evaluation for carotid bruit with supplemental radiographic or sonographic evaluation if indicated
- Supplemental imaging studies (computed tomography, magnetic resonance imaging, myelography, or diskography) if indicated by history and physical examination
- Electrodiagnostic studies if indicated by history and physical examination

**Operative procedure and physician qualification**

- Articular and high-velocity thrust techniques that do not compromise vertebral artery system, with particular avoidance of extensive rotation and extension in combination
- Physician competence in techniques just described

**Table 2**  
**Special Considerations for**  
**Manipulative Treatment**  
**With Patient Under Anesthesia:**  
**Lumbar Spine and Pelvis**

**Indications**

- Acute and chronic lumbar, pelvic, or lower extremity musculoskeletal syndromes nonresponsive to conservative management
- Somatic dysfunction considered to be a significant component of such syndromes
- Lumbar disk syndrome without evidence of acute neurologic deficit, nonresponsive to conservative care

**Contraindications**

*Absolute*

- Hypermobility/instability
- Unstable spondylolisthesis

*Relative*

- Herniated nucleus pulposus with extruded free fragment
- Advanced spondylosis and spondylarthrosis
- Progressive neurologic deficit of lower extremity

**Preoperative evaluation**

- X-ray films of lumbar spine and pelvis including anteroposterior, lateral, and both oblique projections, supplemented by flexion/extension lateral and sidebending anteroposterior motion studies
- Supplemental imaging studies (computed tomography, magnetic resonance imaging, myelography, or diskography) as indicated by history and physical examination
- Complete neurologic physical examination
- Electrodiagnostic studies (electromyography and nerve conduction) as indicated by history and physical examination

**Operative procedure and physician qualification**

- Articular and high-velocity thrust techniques that do not pull unnecessary rotary torque through segments of the lumbar spine
- Physician competence for techniques just described

cases with chronic changes. Techniques include one- and two-person lateral recumbent and Sims position procedures<sup>5,11</sup> for mobilization in both neutral and non-neutral mechanics. Long axis extension techniques<sup>14,15</sup> are frequently useful in the pelvic girdle for pubic and sacroiliac dysfunction.

Siehl,<sup>1</sup> Mensor,<sup>5</sup> and Clybourne<sup>12</sup> also recommend maximal straight-leg raising and trunk flexion as a component of the procedure, especially to stretch out adhesive soft tissue. The operative procedure should be planned carefully so that the significant areas of dysfunction are specifically treated and that attention is given to the total musculoskeletal system. The preoperative structural examination is critical for this purpose.

### Complications

Temporary flare-up of symptoms after this procedure has been reported by several patients.<sup>5</sup> This flare-up is attributed to stretching of adhesions and mobilization of inflamed soft tissue. It is easily controlled with appropriate postoperative care. Serious complications have been rare. Poppen<sup>6</sup> reported two cases of paralysis after manipulation by competent orthopedic surgeons with the patient under anesthesia. This complication occurred in a population of 400 cases of intervertebral disk disease. It appears that serious complications can be avoided by appropriate patient selection, suitable operative technique by a competent practitioner, and consideration for the contraindications and potential complications.

### Postoperative care

The standard postoperative protocol should include appropriate analgesics and antiinflammatory agents to treat anticipated postoperative flare-up of symptoms. Orthoses, such as cervical collars and lumbosacral belts, may be appropriate but for only short periods. The enhanced motion achieved by the procedure should be maintained by both active and passive ranges of motion with appropriate stretching and strengthening exercises as indicated. Postoperative follow-up with manual medicine other types is usually indicated for short periods.

### Physician qualifications

Because the patient no longer has natural defenses while the high-velocity procedures are being carried out, the skill of the operating physician is crucial. It has been reported that postoperative hospitalization was extended in patients treated by physicians less experienced than those physicians who had extensive experience in the procedures.<sup>3</sup>

Manipulation with the patient under anesthesia should be performed by graduate manual medicine practitioners who have high-level skill and have been trained in structural diagnosis and manipulative treatment. They should have experience in manipulation while the patient is under anesthesia, with a minimum of ten cases under supervision. Additional experience in musculoskeletal medicine, such as graduate training and certification in orthopedic surgery, rheumatology, physical medicine and rehabilitation, osteopathic manipulative medicine (philosophy and practice), and general practice, is valuable but not required.

It is strongly recommended that a team of operative manual medicine physicians be used.<sup>12,14,15</sup> It takes several operators to control appropriately all aspects of the musculoskeletal system throughout the procedure. Additionally, an experienced team can accomplish the procedure more quickly and save anesthesia time. Many of the techniques recommended, including the two-person Sims technique and the long-axis distraction technique for sacroiliac dysfunction, require a minimum of two operators.

Tables 1 and 2 summarize specific considerations involved in use of manipulative treatment with the patient under anesthesia in somatic dysfunctions of the cervical and lumbar spine and pelvis.

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