Lesson 288: PreAnesthetic Assessment of the Patient for Manipulation Under Anesthesia

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Needs statement
As alternative therapies are introduced to traditional medical care, the anesthesiologist may be called on to assist with procedures that are unfamiliar. In addition, concerns about medicolegal implications often arise when patients are being managed for chronic pain. As a result, health care workers may be unwilling to participate in management strategies that include unfamiliar procedures. New and evolving procedures—often involving specialties that are outside the anesthesiologist’s comfort zone—have been identified as topics for presentation in this series.
**Learning objectives**

At the end of this activity, the participant should be able to:

1. Delineate the controversy surrounding the interaction between allopathic medicine and chiropractic therapy.
2. Identify 3 major complications to the shoulder that can occur from manipulation under anesthesia (MUA).
3. Detail necessary additional precautions when monitoring a patient undergoing MUA.
4. Describe an anesthetic plan for MUA.
5. List indicated preoperative tests.
6. Recount a brief history of chiropractic.
7. Summarize the differences between chiropractic and osteopathy.
8. List problems with anecdotal reports in making policy decisions.
9. Formulate an alternative plan in case of controversy between medical doctors and chiropractors.
10. Realize possible complications associated with the beach chair position.

**Case history**

A 34-year-old man presented for MUA after a skiing accident in which he sustained tears to the labial meniscus and rotator cuff of the left arm. He developed a frozen shoulder and changes suggestive of complex regional pain syndrome, specifically sudomotor changes, dysesthesias, and allodynia over the upper arm. He previously had responded minimally to a series of 6 stellate ganglion blocks. He was unable to participate meaningfully in physical therapy.

Options presented to the patient included MUA, placement of an epidural catheter for prolonged infusion, or insertion of a spinal cord stimulator. The patient expressed extreme anxiety about the presence of needles in or near his spine, and thought that MUA offered a minimalist approach. He asked that the procedure be performed by his chiropractor. Under these circumstances, multiple anesthesiologists declined to participate in the case.

The great divide between allopathic medicine and chiropractic medicine spans more than 100 years, and even has been the subject of federal litigation. Recently, several respected organizations have included chiropractic manipulation in their practice guidelines. Specifically, the American College of Physicians and the American Pain Society list chiropractic manipulation as recommended therapy in their algorithm for managing low back pain. Similarly, the Department of Defense and the Veterans Health Administration published a clinical practice guideline that supports the use of chiropractic as a conservative measure for alleviating low back pain.

Approximately 6% to 12% of the US population has sought chiropractic care. Insurance and government programs cover the costs in most states. Although manipulation under anesthesia (MUA) has evolved during the past 20 years, the involvement of anesthesiologists in this procedure remains controversial.
A Brief History of Chiropractic

The concept and practice of chiropractic was conceived by Daniel David (D.D.) Palmer in Davenport, Iowa, who started a chiropractic school in 1897. The first chiropractic adjustment was performed on Harvey Lillard, a partially deaf janitor who told Mr. Palmer 3 days later that his hearing seemed improved. The word “chiropractic” was formed by Rev. Samuel Weed from Greek root words meaning “efficient hand.”

Early chiropractic bore many similarities to osteopathy, and was criticized by national and state authorities as the practice of medicine without a license. This led to the incarceration of many chiropractors, including Mr. Palmer. In 1906, Mr. Palmer’s son, B.J., took control of the Palmer School of Chiropractic and quickly adopted the use of technology, including x-rays, as part of chiropractic care. Solon Langworthy, DC, was the first chiropractor to use the word subluxation, and published a book on chiropractic, entitled “Modernized Chiropractic: Special Philosophy; A Distinct System,” in 1906.

In 1849, the American Medical Association (AMA) established a board to investigate quack remedies and nostrums, and to enlighten the public about the nature and dangers of such preparations. The AMA developed relationships with pharmaceutical companies in an effort to curb the proliferation of dangerous patent medicines, and to consolidate the patient base around the medical doctor.

By the turn of the century, the AMA had created the Committee on National Legislation to represent the organization in Washington, DC. It reorganized as the national organization of state and local associations. Intense political pressure by the AMA resulted in unlimited and unrestricted licensing only for medical physicians who were trained in AMA-endorsed colleges. By 1901, medical boards were created in almost every state, requiring licentiates to provide a diploma from an AMA-approved medical college. By 1910, the AMA had become a powerful force from which sprang organized medicine. Chiropractic was dubbed an “unscientific cult” and boycotted by the AMA until a 1987 federal antitrust case.¹

Chiropractors are divided between “straights” and “mixers.” “Traditional straights” claim that chiropractic adjustments are a credible treatment for a wide range of diseases. “Objective straights,” an offshoot of straights, only focus on the correction of chiropractic vertebral subluxations. Mixers, on the other hand, have adopted various (“mixed”) diagnostic and treatment approaches. “Reform” chiropractors are, in theory, an evidence-based offshoot of mixers who rejected the traditional Palmer philosophy, and who tend not to use methods of alternative medicine.

There is continued disagreement over what innate and subluxation mean to chiropractic. Some chiropractors believe in what has been termed innate intelligence, a faith-based, unscientific belief that has been a source of derision for some chiropractors.
Historically, chiropractors were strongly opposed to vaccination based on a belief that all disease was traceable to causes in the spine, and therefore could not be affected by vaccines. D.D. Palmer wrote, “It is the very height of absurdity to strive to ‘protect’ any person from smallpox or any other malady by inoculating them with a filthy animal poison.” Some chiropractors continue to oppose vaccination, despite it being proven one of the most effective public health measures ever. Although most chiropractic writings on vaccination focus on its negative aspects, anti-vaccination sentiment is espoused by what appears to be a minority of chiropractors.

Early opposition to water fluoridation included US chiropractors. Some oppose the fluoridation of water, saying it is incompatible with chiropractic philosophy and an infringement of personal freedoms. Recently, other chiropractors have actively promoted fluoridation, and several chiropractic organizations have endorsed scientific principles of public health.

Federal litigation pertaining to attempts by organized medicine to quash chiropractic reached a decisive point with the suit Wilk et al. vs. AMA, brought by Chester Wilk, DC, of Illinois and 5 co-plaintiffs against the AMA and several co-defendants. After 2 trials, Judge Getzendanner issued her opinion on Sept. 25, 1987, that the AMA had violated section 1, but not section 2, of the Sherman Anti-Trust Act, and that it had engaged in an unlawful conspiracy in restraint of trade “to contain and eliminate the chiropractic profession.”

In 1975, the National Institutes of Health brought chiropractors, osteopaths, medical doctors, and PhD scientists together at a conference on spinal manipulation to develop strategies to study the effects of this treatment. In 1978, the *Journal of Manipulative and Physiological Therapeutics* was launched, and was included in Index Medicus of the National Library of Medicine in 1981.

Attempts to transition chiropractic to a scientific basis can be traced to a 1983 commentary, “Notes from the [chiropractic college’s] underground,” in the *Journal of Manipulative and Physiological Therapeutics* in which Kenneth F. DeBoer, then an instructor of basic science at Palmer College in Iowa, revealed the ability of a scholarly journal to empower faculty at the chiropractic schools. His opinion piece demonstrated the authority of the faculty to challenge the status quo, publicly address relevant (albeit sensitive) issues related to research, training, and skepticism at chiropractic colleges, and produce cultural change within the chiropractic schools to raise research and professional standards. It was a rallying call for chiropractic scientists and scholars. By the mid-1990s, a growing scholarly interest in chiropractic helped efforts to improve the quality of service and establish clinical guidelines that recommended manual therapies for acute low back pain.

It should be noted that the vast majority of studies published in the *Journal of Manipulative and Physiological Therapeutics* are case series, which according to the Agency for Healthcare Research and Quality’s classification of evidence-based studies are—at best—classified as level III (not considered pervasive).

**Contrast With Osteopathy**

It is important to differentiate between chiropractic and osteopathy. The goal of osteopathic manipulation is the resolution of what many osteopaths call somatic dysfunction in an attempt to aid the body’s own recuperative faculties. Osteopathic manual treatment of the musculoskeletal system involves a diverse array of techniques. These normally are employed together with dietary, postural,
and occupational therapy, in addition to counseling, in an attempt to help patients recover from illness and injury, and minimize or manage pain and disease. The AMA recognizes the practice of osteopathy as the practice of medicine. The Doctor of Osteopathy degree is awarded at the end of the training program (similar in many ways to those of traditional medical schools).

Chiropractic requires 4,300 to 5,000 hours of instruction, mostly didactic. There are 18 accredited schools in the United States; all but 1 are run privately. Degrees that may be awarded to chiropractic students include the doctorate, bachelor of science in human biology, and associate in arts of biologic sciences.

The American College of Physicians under the authorship of Chou et al included the following as part of the clinical practice guideline on the care of acute low back pain: “For patients who do not improve with self-care options, clinicians should consider the addition of nonpharmacologic therapy with proven benefits—for acute low back pain, spinal manipulation; for chronic or subacute low back pain, intensive interdisciplinary rehabilitation, exercise therapy, acupuncture, massage therapy, spinal manipulation, yoga, cognitive-behavioral therapy, or progressive relaxation (weak recommendation, moderate-quality evidence).” As a result, this guideline legitimized chiropractic intervention as part of a widely recognized practice guideline.

**Anecdotes Are Not Science**

A lack of scientific, objective measurement, and reliance on anecdote, is best demonstrated by a study of MUA for low back pain. Palmieri and Smoyak sought to evaluate the efficacy of MUA using self-report questionnaires. Self-report outcome assessment instruments were used to evaluate changes in patients receiving MUA versus those not receiving the manipulation. The study was conducted in 2 ambulatory surgical centers and 2 chiropractic clinics and included 87 patients.

Doctors who performed MUA at 2 centers participating in the study selected patients from a convenience sample. Patients in the intervention group (n=38) received MUA. Patients in the nonintervention group (n=49) received traditional chiropractic treatment. For outcome measures, a Numeric Pain Scale (NPS) assessment and the Roland-Morris Disability Questionnaire (RMDQ) were evaluated at baseline, after the procedure, and 4 weeks later. The results were documented and compared.

The practitioners found the average scores of the NPS assessments decreased by 50% in the MUA group; average scores from the RMDQ decreased by 51%. In the nonintervention group, the average NPS scores decreased by 26%; mean scores from the RMDQ decreased by 38%.

The investigators concluded that, in this sample of patients with chronic low back pain, self-reported outcomes improved after the procedure and at follow-up evaluation. Furthermore, there was more improvement reported in the intervention group than the nonintervention group.

Although these results may be suggestive, they merely support the need for large-scale studies on MUA. The study also revealed that self-report outcome assessments are administered easily and are a dependable method to study MUA. Flaws in the report include a lack of randomization, a lack of description of comparators between the 2 groups, and a lack of objective measurement of pain relief, that is, a reliance on numeric values rather than actual visual analog scales. Yet, on the basis of this
“science,” the authors proclaimed success. This lack of strict methodology pervades the chiropractic literature and renders the journal full of anecdotal conclusions.

**The Process of MUA**

The rationale behind MUA is the ability to restore range of motion while maintaining patient comfort, usually under moderate to deep sedation. The first report of MUA was published in The Lancet more than 80 years ago. Riches reported a retrospective study of 113 patients who received MUA for low back pain during an 8-year period. The tabulated data collected from patient questionnaires demonstrated that 75% of patients showed improvement. Since that study, there have been a large number of other reports; however, almost all of them are based on case series.

A typical session of MUA involves manipulation and mobilization of multiple joints, taking an extremity or portion of the spine through the full range of motion during a 20-minute period. Both high- and low-velocity thrusts are employed. All range of motion mobilizations are performed to both the active and passive end range as previously exhibited by the patient when fully conscious. The goal is to gently improve on any limitation in range of motion.

For low back pain, a number of stretches are applied to the lumbar spine and pelvis. Typically, therapy begins with straight leg mobilization with dorsiflexion of the foot applied, taking the leg (and thus the hip) as close to 90 degrees as possible. Next, various knee-to-chest maneuvers are undertaken. All maneuvers are applied bilaterally. Applying the Fabere-Patrick maneuvers, both hips are mobilized, and then the hip is taken through internal and external rotation. Attention is turned to the lumbar spine, applying traction by bringing the patient’s knee to his or her chest. The patient is then turned to the lateral position with the lower extremity in flexion, and the lumbar spine is flexed and extended. The sacroiliac joint also is manipulated in this position. After all maneuvers are completed, the patient is returned to the supine position and transported to the recovery room.

**MUA Complications**

Using an orthopedic surgery perspective (allopathic), Loew et al studied intraarticular lesions in patients with primary frozen shoulder who underwent MUA. The prospective trial was conducted between 2001 and 2003 in 30 patients. Affected shoulders were manipulated while patients were under general anesthesia. Exclusion criteria were secondary stiffness caused by rotator cuff tears, and glenohumeral arthritis. After manipulation, the joints of each patient were examined by arthroscopy and any intraarticular lesions documented. In all patients during manipulation, a significant improvement in the range of motion was achieved. Under anesthesia, flexion improved on average from 70 (±33) degrees to 180 (±15) degrees; abduction from 50 (±20) degrees to 170 (±25) degrees; and external rotation from −5 (±10) degrees to +40 (±20) degrees.

Arthroscopy revealed hemarthrosis in all patients after manipulation. In 22 patients, localized synovitis was detected in the area of the rotator interval, whereas in 8 patients, disseminated synovitis was observed as a feature of adhesive capsulitis. After manipulation, the capsule was ruptured in most patients. The rupture was located superiorly in 11 patients. The anterior capsule was ruptured up to the infraglenoid pole in 24 patients, and 16 patients had a capsular lesion located posteriorly. In 4
patients, iatrogenic superior labrum anterior–posterior lesions were observed. Further injuries detected were 3 fresh partial tears of the subscapularis tendon, 4 anterior labral detachments (1 with a small osteochondral defect), and 2 tears of the middle glenohumeral ligament. In 18 patients no additional joint damage was found after manipulation. The authors concluded that although MUA is effective in improving joint mobilization, the procedure can cause iatrogenic intraarticular damage.

Kivimäki et al\textsuperscript{11} studied the effect of MUA in patients with frozen shoulder. A blinded randomized trial with a 1-year follow-up was conducted at 3 referral hospitals in southern Finland. The physician investigators randomly assigned 125 patients with clinically verified frozen shoulder to the manipulation group (n=65) or control group (n=60). Both groups were instructed in specific therapeutic exercises by physiotherapists. Clinical data were gathered at baseline, 6 weeks, and 3, 6, and 12 months after randomization.

There was no difference in shoulder pain or working ability between the 2 groups at any time during follow-up. Small differences in range of movement were detected in the manipulation group. Perceived shoulder pain decreased during follow-up equally in the 2 groups; at the 1-year follow-up, only slight pain remained. The authors concluded that MUA does not add effectiveness to an exercise program carried out by the patient after instruction.

Overall, chiropractors are sued at a greater rate than physicians, which may explain some of the reluctance of the latter to become involved in chiropractic.\textsuperscript{12} Based on statistics from 1997 to 2000 in California, there were 4.5 disciplinary actions per 1,000 chiropractors annually, compared with 2.27 disciplinary actions per 1,000 medical doctors annually. The incident rate for fraud was 9 times greater among chiropractors than medical doctors (1.99 per 1,000 vs 0.2 per 1,000, respectively).

**Management of the Case Presented**

Because the patient was an otherwise healthy 34-year-old, no laboratory examinations were ordered preoperatively. There was no need for a chest x-ray or electrocardiography (EKG). Preanesthetic history and physical examination findings were documented separately because the chiropractic examination record did not address the airway, neurologic, cardiologic, or pulmonary status of the patient. The physical examination findings included a Mallampati class 1 airway, and chest clear to auscultation; the cardiac findings were normal. Changes observed in the left upper extremity were consistent with complex regional pain syndrome type 2.

Standard monitoring (American Society of Anesthesiologists) was applied. In the arrangement of the EKG cables and leads, the pulse oximeter cable, blood pressure cuff tubing, CO2 sampling tubing, and oxygen supplementation tubing were bundled together with extra lengths to allow for position changes during the procedure. The blood cuff and pulse oximeter were placed on a site away from the area to be manipulated.

**Anesthetic Technique**

The plan was to conduct the case with the patient in the beach chair position. Several case reports\textsuperscript{13,14} that involved serious complications have been discussed in the Anesthesia Patient Safety Foundation newsletter; the complications stemmed mainly from the failure to recognize the differential in measuring blood pressure in the arm and the perfusion pressure reaching the brain. Thus, in
controlling the blood pressure care was taken not to allow a mean arterial pressure of less than 75 mm Hg as measured by an arm cuff.

After discussion with the chiropractor, deep sedation without muscle relaxation was planned. With the patient in the supine position, an induction dose of 1.5 mg/kg of propofol, along with small doses of midazolam and fentanyl were administered. Spontaneous respiration was maintained without airway instrumentation.

The patient was then placed in the beach chair position with his left shoulder at the edge of the table. His arm was first placed into maximum extension and then flexion; it was noted that an audible crepitus was heard while his arm was rotated. After a pattern of extension and rotation was conducted 3 times, the patient was turned to the right lateral decubitus position and the scapula was manipulated.

The patient was returned to the supine position for transport to the recovery room. Analgesia administered in the recovery room consisted solely of ketorolac. The patient was discharged within 30 minutes with instructions to continue his physical therapy.

**An Ethical Dilemma**

In this case, the patient needed to participate in physical therapy but was resistant to using conventional treatment modalities and practitioners. Several anesthesiologists declined to participate in the anesthetic care of this patient because of the presence of the chiropractor. The problem was resolved when a pain medicine practitioner who previously had rendered a consultation with this patient offered to administer the sedation. The rationale was that since the practitioner had a previous relationship with the patient, he could not abandon the latter at this point.

**Conclusion**

Because guidelines issued by the American College of Physicians/American Pain Society, as well as by the Department of Defense/Veterans Health Administration, recognize the utility of chiropractic therapy in certain conditions, it is impossible to entirely dismiss the participation of chiropractors in the health care system. However, individual anesthesiologists and nurse anesthetists retain the right to decline consultation with chiropractic practitioners. It is up to individual practitioners to use their judgment and exercise their First Amendment rights in deciding whether to accept a consultation from a chiropractor or participate in prescribed therapy.

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Visit [www.mssm.procampus.net](http://www.mssm.procampus.net) today for instant online processing of your CME post-test and evaluation form. There is a registration fee of $15 for this non–industry-supported activity. For assistance with technical problems, including questions about navigating the Web site, call toll-free customer service at (888) 345-6788 or send an e-mail to Customer.Support@ProCEO.com. For inquiries about course content only, send an e-mail to ram.roth@mssm.edu. Ram Roth, MD, is director of PreAnesthetic Assessment Online and assistant professor of anesthesiology at The Mount Sinai School of Medicine, New York, NY.

**Post-test**

1. An organized boycott of chiropractic would be considered a violation of which section(s) of the Sherman Anti-Trust Act?
   
   a. Section 1  
   b. Section 2  
   c. Neither section 1 nor section 2  
   d. Both sections 1 and 2  

2. In preparing a case for manipulation under anesthesia (MUA) of the shoulder, care must be taken to allow adequate additional length of monitoring cables to follow the patient through various planned positions. How is this best accomplished with the patient in the supine position?
   
   a. All cables should run axially and then away from the affected extremity.  
   b. Whatever suits the anesthesiologist is best.  
   c. All cables should run cephalad with the shortest possible length.  
   d. All cables should run over the affected joint.  

3. All of the following statements about chiropractic are true, except:
   
   a. “Mixers” combine spinal adjustments with other treatments.  
   b. “Straights” solely rely on spinal adjustments.  
   c. “Reform” chiropractors are an evidence-based offshoot of “mixers” who rejected the traditional Palmer philosophy and who tend not to use methods of alternative medicine.  
   d. All chiropractors oppose water fluoridation.  

4. For chronic low back pain, the American College of Physicians/American Pain Society guidelines do not specifically recommend:
   
   a. spinal manipulation  
   b. intensive interdisciplinary rehabilitation  
   c. acupuncture  
   d. prolotherapy
5. In a prospective study by Loew et al, arthroscopy revealed hemarthrosis in what percentage of patients after MUA?

a. 100  
b. 0  
c. 57  
d. It depended entirely on the duration of the manipulation.

6. Which of the following statements is not true regarding the study by Kivimäki et al?

a. There was no difference in shoulder pain or working ability at any time during follow-up between the 2 groups participating in the prospective, randomized trial.  
b. Small differences in the range of movement were detected in favor of the manipulation group.  
c. During follow-up, perceived shoulder pain decreased equally in the 2 groups, and at 1 year only slight pain remained.  
d. The study was performed only by chiropractors.

7. After MUA, rupture of the shoulder joint capsule:

a. occurs in almost all patients  
b. is not clinically significant  
c. requires immediate surgical intervention  
d. always occurs posteriorly

8. After MUA, all of the following injuries have been detected by arthroscopy, except:

a. partial tears of the subscapularis tendon  
b. anterior labral detachments  
c. dislocation of the joint  
d. tears of the middle glenohumeral ligament

9. Which of the following statements about chiropractic is not true?

a. Chiropractors are sued at a greater rate than physicians.  
b. In California, statistics from 1997 to 2000 revealed 4.5 disciplinary actions per 1,000 chiropractors annually, compared with 2.27 disciplinary actions per 1,000 MDs annually.  
c. In California, statistics from 1997 to 2000 revealed an incident rate for fraud that was 9 times greater among chiropractors than MDs (1.99 of 1,000 vs 0.2 of 1,000, respectively).  
d. Physicians and nurse anesthetists must accept consultations from chiropractors.

10. The beach chair position may result in a significant pressure differential between the measured pressure in the arm and the perfusion pressure reaching the brain. Therefore:

a. mean blood pressure measured in the arm should be maintained above 70 mm Hg  
b. prophylactic treatment with ephedrine is indicated  
c. a mean blood pressure reading of 60 mm Hg in the leg is safe  
d. the beach chair position should be abandoned