08.01.20 Manipulation Under Anesthesia

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Related Policies:

- 02.01.21 Temporomandibular Joint (TMJ) Dysfunction: Diagnosis and Treatments

Summary

Description

Notes:

- *This policy does not address manipulation under anesthesia for fractures or completely dislocated joints, see Related Policies above 02.01.21.*
- *Some group health plans may not have a temporomandibular joint (TMJ) benefit. Please refer to the member's benefit booklet for availability of benefits. Member's benefits may vary according to benefit design: therefore, member benefit language should be reviewed before applying the terms of this medical policy.*

Manipulation under anesthesia consists of a series of mobilization, stretching, and traction procedures performed while the individual is sedated (usually with general anesthesia or moderate sedation).

Summary of Evidence

For individuals who have chronic spinal, sacroiliac, or pelvic pain who receive manipulation under anesthesia (MUA), the evidence includes case series, observational studies, and nonrandomized comparative studies. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment-related morbidity. Scientific evidence on spinal manipulation under anesthesia, spinal manipulation with joint anesthesia, and spinal manipulation after epidural anesthesia and corticosteroid injection is very limited. No randomized controlled trials (RCTs) have been identified. Evidence on the efficacy of manipulation under anesthesia over several sessions or for multiple joints is also lacking. Safety outcomes in these settings are poorly described. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have adhesive capsulitis of the shoulder (frozen shoulder) who receive MUA, the evidence includes RCTs, nonrandomized comparative and observational studies. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment-related morbidity. The majority these studies are limited by small sample size and short-term follow-up of 12-month, however, study results were consistent in showing that pre- and post-operative OSS showed improvement in both pain and function to include improved ROM (Woods et al 2017 and Bidwai 2016). MUA is also considered a safe procedure with minimal to no complications in the treatment of adhesive capsulitis of the shoulder. The evidence is sufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have stiffness (fibrosis) of the knee following total knee arthroplasty who receive manipulation under anesthesia, the evidence includes systematic review, nonrandomized comparative and noncomparative studies. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment-related morbidity. Randsborg et al 2020 in this observational study found clinical and statistical improvement in the ROM of 35^{o} at a mean follow-up of 26.4 months and 87% of the patients achieved flexion of more than 90^{o} flexion, which supports previous findings that MUA for joint stiffness after TKR improves ROM in the long term. In the systematic review by Gui et. al. (2018) the investigators found that the overall analysis of the current studies found MUA to be effective in improving ROM (KOOS scores) and patient satisfaction with improved VAS scores, in appropriate patient populations, with ideal MUA occurring between 4 and 12 weeks post-operatively and with an overall 1% rate of complication. The evidence is sufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have temporomandibular joint (TMJ) syndrome who receive MUA, the evidence includes an observational study. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment-related morbidity. The available evidence for MUA for temporomandibular joint syndrome is limited to a small noncomparative, prospective study with limited follow-up. Out of 55 patients that were treated, 15 patients showed improvement and 6 patients showed partial improvement of pre-treatment opening 20 mm (range of 13 to 27) to post MUA with a median opening of 38 mm (range of 35 to 56). While this study may show promise there is paucity of evidence supporting the use of MUA in the treatment temporomandibular joint syndrome. Based on the current peer reviewed medical evidence there are currently no RCTs or studies reporting long-term follow-up with outcomes. The evidence is insufficient to determine the effects of the technology on net health outcomes.

For individuals who have stiffness of the toe following first metatarsophalangeal joint (MTPJ) surgery who receive MUA following hallux valgus or hallux rigidus surgery, the evidence includes noncomparative

observational studies. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment-related morbidity. While these studies may show promise they are of small sample sizes, and lack of control and comparison groups. Currently there are no RCTs. The safety and efficacy of MUA for this indication at this time cannot be established. The evidence is insufficient to determine the effects of the technology on net health outcomes.

For individuals who have acute or chronic conditions of the following joints elbow, wrist, hand, finger, hip and ankle who receive MUA, the evidence includes systematic review (case series, case reports [hip]), noncomparative observational study for elbow, and retrospective chart reviews and single case series for joints related to wrist, hand, finger, and ankle. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment-related morbidity. There are currently no RCTs or any studies reporting long term follow-up outcomes. At this time there is insufficient evidence to establish the safety and effectiveness regarding MUA for other joints such as elbow, hip, wrist, hand, finger and ankle. The evidence is insufficient to determine the effects of the technology on net health outcomes.

Additional Information

2009 Input

Clinical input was sought to help determine whether the use of manipulation under anesthesia for individuals with chronic spinal and pelvic pain would provide a clinically meaningful improvement in net health outcome and whether the use is consistent with generally accepted medical practice. In response to requests, input was received from 2 physician specialty societies and 4 academic medical centers while this policy was under review. Input from the 7 reviewers agreed that manipulation under anesthesia for chronic spinal and pelvic pain is investigational.

OBJECTIVE

The objective of this evidence review is to evaluate whether manipulation under anesthesia improves the net health outcome in individuals with various conditions including chronic spinal, sacroiliac, or pelvic pain, adhesive capsulitis of the shoulder, stiffness after total knee arthroplasty and pain management of other joints (ankle, elbow, finger, hand, hip, temporomandibular joint (TMJ), toe and wrist).

PRIOR APPROVAL

Not applicable.

POLICY

Notes:

- *This policy does not address manipulation under anesthesia for fractures or completely dislocated joints, see Medical Policy* 02.01.21 Temporomandibular Joint (TMJ) Dysfunction: Diagnosis and Treatments.
- *Some group health plans may not have a temporomandibular joint (TMJ) benefit. Please refer to the member's benefit booklet for availability of benefits. Member's benefits may vary according to benefit design: therefore, member benefit language should be reviewed before applying the terms of this medical policy.*

Manipulation Under Anesthesia for Treatment of Adhesive Capsulitis of the Shoulder

Shoulder manipulation under anesthesia may be considered **medically necessary** for the treatment of adhesive capsulitis of the shoulder when **ALL** the following criteria are met:

1. Pain and stiffness with limited range of motion which significantly interfere with activities of daily living;
2. Other etiologies of shoulder pain have been excluded by clinical history, physical exam, and appropriate imaging studies to exclude significant glenohumeral osteoarthritis;
3. Failure of a conservative treatment regimen, including acetaminophen, nonsteroidal anti-inflammatory drugs (NSAIDs), and/or oral corticosteroids for at least 3 weeks; physical therapy/home exercise program for at least 6 weeks; and an intra-articular corticosteroid injection.

Shoulder manipulation under anesthesia not meeting the above criteria or involving serial treatment sessions is considered **investigational** because the evidence is insufficient to determine the effects of the technology on net health outcomes.

Manipulation Under Anesthesia for Treatment of Stiffness after Total Knee Arthroplasty (TKA)

Knee manipulation under anesthesia may be considered **medically necessary** for the treatment of arthrofibrosis following total knee arthroplasty when **ALL** the following criteria are met:

1. Pain and stiffness with limited range of motion which significantly interfere with activities of daily living;
2. Other etiologies of knee pain/stiffness have been excluded by clinical history, physical exam, and appropriate imaging studies (e.g., mispositioned/incorrectly sized arthroplasty components);
3. Failure of a conservative treatment regimen, including acetaminophen and/or nonsteroidal anti-inflammatory drugs (NSAIDs) for at least 3 weeks and physical therapy/home exercise program for at least 6 weeks.

Knee manipulation under anesthesia not meeting the above criteria or involving serial treatment sessions is considered **investigational** because the evidence is insufficient to determine the effects of the technology on net health outcomes.

Manipulation Under Anesthesia of the Spine

Spinal manipulation under anesthesia for the treatment of chronic spinal (cranial, cervical, thoracic, lumbar) pain and chronic sacroiliac joint pain is considered **investigational** because the evidence is insufficient to determine the effects of the technology on net health outcomes.

Manipulation Under Anesthesia for Other Joints

Manipulation under anesthesia including but not limited to the following joints for all indications whether single or serial treatment sessions is considered **investigational** because the evidence is insufficient to determine the effects of the technology on net health outcomes:

- Ankle
- Elbow
- Finger
- Hand
- Hip
- Pelvis

- Temporomandibular joint (TMJ) (*except for surgical treatment for reduction of fracture or dislocation of TMJ, see medical policy* 02.01.21 Temporomandibular Joint (TMJ Dysfunction: Diagnosis and Treatments)
- Toe
- Wrist

Manipulation under anesthesia involving multiple body joints is considered **investigational** for the treatment of all indications because the evidence is insufficient to determine the effects of the technology on net health outcomes.

POLICY GUIDELINES

Definitions

Arthrofibrosis: A complication of injury or trauma where an excessive scar tissue response leads to painful restriction of joint motion, with scar tissue forming within the joint and surrounding soft tissue spaces and persisting despite rehabilitation exercises and stretches.

Coding

See the Codes table for details.

BACKGROUND

Manipulation Under Anesthesia

Manipulation is intended to break up fibrous and scar tissue to relieve pain and improve range of motion. Anesthesia or sedation is used to reduce pain, spasm, and reflex muscle guarding that may interfere with the delivery of therapies and to allow the therapist to break up joint and soft tissue adhesions with less force than would be required to overcome patient resistance or apprehension. Manipulation under anesthesia is generally performed with an anesthesiologist in attendance. Manipulation under anesthesia is an accepted treatment for isolated joint conditions, such as arthrofibrosis of the knee and adhesive capsulitis. However, it may also be utilized in the treatment of other joints such as the ankle, elbow, finger, hand, hip, spine, pelvis, temporomandibular joint (TMJ), toe and wrist for acute and chronic pain conditions.

Manipulation under anesthesia (MUA) has been proposed as a treatment modality for acute and chronic pain conditions, particularly of the spine, when standard care, including manipulation, and other conservative measures have failed. Manipulation under anesthesia of the spine has been used in various forms since the 1930s. Complications from general anesthesia and forceful long-lever, high-amplitude nonspecific manipulation procedures led to decreased use of the procedure in favor of other therapies. MUA was modified and revived in the 1990s. This revival has been attributed to increased interest in spinal manipulative therapy and the advent of safer, shorter-acting anesthesia agents used for conscious sedation.

Manipulation Under Anesthesia Administration

Manipulation under anesthesia of the spine is described as follows: after sedation, a series of mobilization, stretching, and traction procedures to the spine and lower extremities are performed and may include passive stretching of the gluteal and hamstring muscles with straight-leg raise, hip capsule stretching and mobilization, lumbosacral traction, and stretching of the lateral abdominal and paraspinal muscles.[1] After the stretching and traction procedures, spinal manipulative therapy is delivered with high-velocity, short-amplitude thrust applied to a spinous process by hand, while the upper torso and lower extremities are stabilized. Spinal manipulative therapy may also be applied to the thoracolumbar or cervical area when necessary to address low back pain.

MUA takes 15 to 20 minutes, and after recovery from anesthesia, the patient is discharged with instructions to remain active and use heat or ice for short-term analgesic control. Some practitioners recommend performing the procedure on 3 or more consecutive days for best results. Care after MUA may include 4 to 8 weeks of active rehabilitation with manual therapy, including spinal manipulative therapy and other modalities.

Manipulation has also been performed after injection of local anesthetic into lumbar zygapophyseal (facet) and/or sacroiliac joints under fluoroscopic guidance (manipulation under joint anesthesia/analgesia) and after epidural injection of corticosteroid and local anesthetic (manipulation post epidural injection). Spinal manipulation under anesthesia has also been combined with other joint manipulation during multiple sessions. Together, these therapies may be referred to as medicine-assisted manipulation.

Regulatory Status

Manipulative procedures are not subject to regulation by the U.S. Food and Drug Administration.

RATIONALE

This evidence review was created in April 2012 and has been updated regularly with searches of the PubMed database. The most recent literature update was conducted through May 2025.

Evidence reviews assess the clinical evidence to determine whether the use of a technology improves the net health outcome. Broadly defined, health outcomes are length of life, quality of life, and ability to function including benefits and harms. Every clinical condition has specific outcomes that are important to patients and to managing the course of that condition. Validated outcome measures are necessary to ascertain whether a condition improves or worsens; and whether the magnitude of that change is clinically significant. The net health outcome is a balance of benefits and harms.

To assess whether the evidence is sufficient to draw conclusions about the net health outcome of a technology, 2 domains are examined: the relevance and the quality and credibility. To be relevant, studies must represent 1 or more intended clinical use of the technology in the intended population and compare an effective and appropriate alternative at a comparable intensity. For some conditions, the alternative will be supportive care or surveillance. The quality and credibility of the evidence depend on study design and conduct, minimizing bias and confounding that can generate incorrect findings. The randomized controlled trial (RCT) is preferred to assess efficacy; however, in some circumstances, nonrandomized studies may be adequate. Randomized controlled trials are rarely large enough or long enough to capture less common adverse events and long-term effects. Other types of studies can be used for these purposes and to assess generalizability to broader clinical populations and settings of clinical practice.

Manipulation Under Anesthesia for Chronic Spinal, Sacroiliac or Pelvic Pain

Clinical Context and Therapy Purpose

The purpose of manipulation under anesthesia (MUA) is to provide a treatment option that is an alternative to or an improvement on existing therapies, such as conservative management, in individuals with chronic spinal, sacroiliac, or pelvic pain.

The following PICO was used to select literature to inform this review.

Populations

The relevant population of interest is individuals with chronic spinal, sacroiliac, or pelvic pain.

Interventions

The therapy being considered is MUA.

MUA consists of a series of mobilization, stretching, and traction procedures performed while the individual is sedated (usually with general anesthesia or moderate sedation). MUA takes 15 to 20 minutes, and after recovery from anesthesia the individual is discharged with instructions to remain active and use heat or ice for short-term analgesic control.

Comparators

Comparators of interest include conservative management.

Conservative management includes steroid regimens, blood pressure medication, muscle relaxers, and physical therapy.

Outcomes

The general outcomes of interest are symptoms, functional outcomes, quality of life, and treatment-related morbidity.

The existing literature evaluating manipulation under anesthesia as a treatment for chronic spinal, sacroiliac, or pelvic pain has varying lengths of follow-up, ranging from 2 weeks to 6 months. While studies described below all reported at least 1 outcome of interest, longer follow-up was necessary to fully observe outcomes. Therefore, 6 months of follow-up is considered necessary to demonstrate efficacy.

Table 1 summarizes the patient-reported outcome measures described in this review.

Table 1. Patient Self-Administered Outcome Measure Tools

Name	Description	Scoring	MCID
Numeric Pain Scale	Numbered scale by which patients rate their pain, similar to VAS	0-10 scale: • 10=excruciating pain • 0=no pain	Reduction of ≥2 points (≈30%) to be clinically important

Roland-Morris Disability Questionnaire	24 questions that measure low back pain-related disability	"Yes" answers are totaled to determine disability (1 to 24) Score of ≥14 represents significant disability	Change of ≥4 points required for clinically applicable change to be measured accurately
Bournemouth Questionnaire	7-question, multidimensional tool to assess outcome of care in a routine clinical setting Takes into account cognitive and affective aspects of pain Two versions: low back pain and nonspecific neck pain	Each question rated on a numeric rating scale from 0 to 10: • 0=much better • 5=no change • 10=much worse Scores are totaled, for minimum of 0 and maximum of 70	Percentage improvement of 47% in back pain and 34% in neck pain
Patient's Global Impression of Change	7-point scale of how a patient perceives the efficacy of treatment, a rating of overall improvement from baseline	Scale of 1 to 7: • 1=no change or condition is worse • 2=almost the same • 3=a little better, but no noticeable change • 4=somewhat better, but no real difference • 5=moderately better, slight noticeable change • 6=better, definite improvement with real difference • 7=a great deal better, considerable improvement	Clinically relevant improvement, response of ±6

MCID: minimal clinically important difference; VAS: visual analog scale.

Study Selection Criteria

Methodologically credible studies were selected using the following principles:

- To assess efficacy outcomes, comparative controlled prospective trials were sought, with a preference for RCTs;
- In the absence of such trials, comparative observational studies were sought, with a preference for prospective studies.
- To assess long-term outcomes and adverse events, single-arm studies that capture longer periods of follow-up and/or larger populations were sought.
- Studies with duplicative or overlapping populations were excluded.

Review of Evidence

Dagenais et al (2008) conducted a comprehensive review of the history of manipulation under anesthesia or medicine-assisted manipulation and the published experimental literature. The authors noted there was no research to confirm theories about a mechanism of action for these procedures and that the only randomized controlled trial (RCT) identified was published in 1971 when the techniques for spinal manipulation differed from those used presently. The possibility of serious complications related to manipulative force is also noted, including reported cases of cauda equina syndrome, paralysis, and vertebral fracture and dislocation; the authors state that such complications may be more likely with older techniques, but otherwise note that most reported studies do not describe safety outcomes.

Nonrandomized Comparative Studies

No high-quality RCTs have been identified. A comprehensive review of the literature by Digiorgi (2013) described studies by Kohlbeck et al (2005) and Palmieri and Smoyak (2002) as being the best evidence available for medicine-assisted manipulation and manipulation under anesthesia of the spine.

Kohlbeck et al (2005) reported on a nonrandomized comparative study that included 68 patients with chronic low back pain. All patients received an initial 4- to 6-week trial of spinal manipulation therapy, after which 42 patients received supplemental intervention with manipulation under anesthesia and 26 continued with spinal manipulative therapy. Low back pain and disability measures favored the manipulation under anesthesia group over the spinal manipulative therapy only group at 3 months (adjusted mean difference on a 100-point scale, 4.4 points; 95% confidence interval [CI], -2.2 to 11.0). This difference attenuated at 1 year (adjusted mean difference, 0.3 points; 95% CI, -8.6 to 9.2). The relative odds of experiencing a 10-point improvement in pain and disability favored the manipulation under anesthesia group at 3 months (odds ratio [OR], 4.1; 95% CI, 1.3 to 13.6) and 1 year (OR, 1.9; 95% CI, 0.6 to 6.5).

Palmieri and Smoyak (2002) evaluated the efficacy of self-reported questionnaires to study manipulation under anesthesia in a convenience sample of 87 subjects from 2 ambulatory surgery centers and 2 chiropractic clinics. Thirty-eight patients with low back pain received manipulation under anesthesia and 49 received traditional chiropractic treatment. A numeric rating scale for pain and the Roland-Morris Disability Questionnaire were administered at baseline, after the procedure, and 4 weeks later. Average pain scale scores in the manipulation under anesthesia group decreased by 50% and by 26% in the traditional treatment group; Roland-Morris Disability Questionnaire scores decreased by 51% and 38%, respectively. Although the authors concluded that the study supported the need for large-scale studies on manipulation under anesthesia and that the assessments were easily administered and dependable, no large-scale studies comparing manipulation under anesthesia with traditional chiropractic treatment have been identified.

Observational Studies

Peterson et al (2014) reported on a prospective study of 30 patients with chronic pain (17 lower back, 13 neck) who underwent a single manipulation under anesthesia session with follow-up at 2 and 4 weeks. The primary outcome measure was the Patient's Global Impression of Change. At 2 weeks, 52% of the patients reported clinically relevant improvement (better or much better), with 45.5% improved at 4 weeks. There was a statistically significant reduction in numeric rating scale scores for pain at 4 weeks (p=.01), from a mean baseline score of 4.0 to 3.5 at 2 weeks post-manipulation under anesthesia. Bournemouth Questionnaire scores improved from 24.17 to 20.38 at 2 weeks (p=0.008) and 19.45 at 4

weeks (p=.001). This study lacked a sham group to control for a potential placebo effect. Also, the clinical significance of improved numeric rating scale and Bournemouth Questionnaire scores is unclear, although Hurst and Bolton (2004) described the Bournemouth Questionnaire as a percentage improvement of 47% in back pain and 34% in neck pain.

West et al (1999) reported on a series of 177 patients with pain arising from the cranial, cervical, thoracic, and lumbar spine, as well as the sacroiliac and pelvic regions, who had failed conservative and surgical treatment. Patients underwent 3 sequential manipulations with intravenous sedation followed by 4 to 6 weeks of spinal manipulation and therapeutic modalities; all had 6 months of follow-up. On average, visual analog scale scores improved by 62% in patients with cervical pain and by 60% in patients with lumbar pain. Dougherty et al (2004) retrospectively reviewed outcomes of 20 cervical and 60 lumbar radiculopathy patients who underwent spinal manipulation after epidural injection. After epidural injection of lidocaine (guided fluoroscopically or with computed tomography), methylprednisolone acetate flexion distraction mobilization and then high-velocity, low-amplitude spinal manipulation was delivered to the affected spinal regions. Outcome criteria were empirically defined as a significant improvement, temporary improvement, or no change. Among lumbar spine patients, 22 (37%) noted significant improvement, 25 (42%) reported temporary improvement, and 13 (22%) no change. Among patients receiving a cervical epidural injection, 10 (50%) had significant improvement, 6 (30%) had temporary relief, and 4 (20%) had no change.

Tables 2 and 3 summarize the characteristics and results, respectively, of the key observational studies.

The only study on manipulation under joint anesthesia or analgesia evaluated 4 subjects; it was reported by Dreyfuss et al (1995). Later, Michaelsen (2000) noted that joint-related manipulation under anesthesia should be viewed with “guarded optimism because its success is based solely on anecdotal experience.

Table 2. Summary of Characteristics of Key Observational Studies of Manipulation Under Anesthesia

Study	Study Type	Country	Dates	Participants	Treatment	Follow-Up
Peterson (2014)	Prospective	Switzerland	NR	Patients (N=30) with chronic pain who underwent a single MUA session	MUA for those with low back pain (n=17); MUA for those with neck pain (n=13)	2 and 4 weeks
West (1999)	Case series	US	July 1995-Feb 1997	177 patients with pain arising from the cranial, cervical, thoracic, and lumbar spine, as well as the sacroiliac and pelvic regions who had failed conservative and surgical treatment	Patients underwent 3 sequential manipulations with intravenous sedation followed by 4 to 6 weeks of spinal manipulation and therapeutic modalities	6 months
Dougherty (2004)	Retrospective	US	Nov 1996-	20 cervical and 60 lumbar radiculopathy patients who underwent spinal	Following epidural injection of lidocaine (guided fluoroscopically or with computed	1 year

			Nov 2000	manipulation after epidural injection. The patients ranged in age from 21-76 years with an average age of 43 years. Forty-three percent of the patients were female and 57% were male.	tomography), methylprednisolone acetate flexion distraction mobilization and high-velocity, low-amplitude spinal manipulation were delivered to the affected spinal regions	

MUA: manipulation under anesthesia; NR: not reported.

Table 3. Summary of Results of Key Observational Studies of Manipulation Under Anesthesia

Study	Improvement as Reported by Participant	Bournemouth Questionnaire Scores	Patient's Global Impression of Change
Peterson (2014)			
Baseline		24.17	
2 weeks post		20.38 (p=.008)	
4 weeks post		19.45 (p=.001)	
"better or much better" reported at 2 weeks post			52%
"better or much better" reported at 4 weeks post			45.5%
West (1999)			
% of cervical patients with improvement			62%
% of lumbar patients with improvement			60%
Dougherty (2004)			
Lumbar spine patients			
% noting significant improvement	22 (37%)		
% noting temporary improvement	25 (42%)		
% noting no improvement	13 (22%)		
Patients receiving cervical epidural injection			
% noting significant improvement	10 (50%)		
% noting temporary improvement	6 (30%)		
% noting no improvement	4 (20%)		

Section Summary

For individuals who have chronic spinal, sacroiliac, or pelvic pain who receive manipulation under anesthesia, the evidence includes case series, observational studies, and nonrandomized comparative studies. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment-related morbidity. Scientific evidence on spinal manipulation under anesthesia, spinal manipulation with joint anesthesia, and spinal manipulation after epidural anesthesia and corticosteroid injection is very limited. No RCTs have been identified. Evidence on the efficacy of manipulation under anesthesia over several sessions or for multiple joints is also lacking.

Manipulation Under Anesthesia for Treatment of Adhesive Capsulitis of the Shoulder

Clinical Context and Therapy Purpose

The purpose of MUA is to provide a treatment option that is an alternative to or an improvement on existing therapies, such as conservative management, in individuals with adhesive capsulitis of the shoulder.

The following PICO was used to select literature to inform this review.

Populations

The relevant population of interest is individuals with adhesive capsulitis of the shoulder.

Interventions

The therapy being considered is MUA.

MUA consists of a series of mobilization, stretching, and traction procedures performed while the individual is sedated (usually with general anesthesia or moderate sedation). MUA takes 15 to 20 minutes, and after recovery from anesthesia the individual is discharged with instructions to remain active and use heat or ice for short-term analgesic control.

Comparators

Comparators of interest include conservative management.

Conservative management includes steroid regimens, anti-inflammatory medications, and physical therapy.

Outcomes

The general outcomes of interest are symptoms, functional outcomes, quality of life, and treatment-related morbidity.

Study Selection Criteria

Methodologically credible studies were selected using the following principles:

- To assess efficacy outcomes, comparative controlled prospective trials were sought, with a preference for RCTs;
- In the absence of such trials, comparative observational studies were sought, with a preference for prospective studies.
- To assess long-term outcomes and adverse events, single-arm studies that capture longer periods of follow-up and/or larger populations were sought.
- Studies with duplicative or overlapping populations were excluded.

Review of Evidence

Randomized Controlled Trials

Rangan et al (2020) in a multicenter, pragmatic, three-arm superiority randomized trial compared the clinical effectiveness of 3 treatments, two surgical interventions (manipulation under anesthesia [MUA], arthroscopic capsular release [ACR]) or early physiotherapy plus steroid injection for the treatment of primary frozen shoulder. Both forms of surgery were followed by post-procedure physiotherapy which aligned with the early physiotherapy plus steroid group which involved 12 sessions for 12 weeks. The primary outcome was the Oxford Shoulder Score (OSS; 0-48) at 12 months after randomization, analyzed by initial randomization group, which sought a target difference of 5 OSS points between physiotherapy and either form of surgery, or 4 points between manipulation or capsular release. Out of 914 patients 503 (55%) were randomly assigned and 12 months OSS data was available for 189 (94%) of 201 participants assigned to MUA, 191 (94%) of 203 participants assigned to ACR and 93 (94%) of 99 participants assigned to physiotherapy. The mean group differences were 2.01 points (0.10 to 3.91) between the ACR and MUA groups, 3.06 (0.71 to 5.41) between ACR and physiotherapy, and 1.05 points (-1.28 to 3.39) between MUA and physiotherapy. Eight serious adverse events (ADEs) were reported in the ACR group and two with MUA. The authors concluded “All mean differences on the assessment of shoulder pain and function (OOS) at the primary endpoint of 12 months were less than the targeted differences. Therefore, none of the three interventions were clinically superior. ACR carried higher risks.”

Nonrandomized Comparative Studies

In 2020 Kim et al compared clinical outcomes of manipulation under anesthesia (MUA) to arthroscopic capsular release (ACR) in patients with refractory adhesive capsulitis (AC). Thirty-one patients underwent MUA for refractory AC in a single institution, however, one patient was excluded from the study as she received ACR due to worse results at 3 months after MUA. In the MUA group (n=30) there were 21 females and 9 males with a mean age of 54.5 years. Eleven of these patients had a history of diabetes mellitus (DM).The control group (n=30) who underwent ACR were matched for age and sex with the MUA group. Visual Analog Scale (VAS) pain score, American Shoulder and Elbow Surgeons (ASES) score, and range of motion (ROM, forward flexion, external rotation at the side and internal rotation at the back) were evaluated preoperatively at 3, 6, and 12-months after the procedure. Both groups received the same postoperative rehabilitation protocol. VAS pain score and ASES score significantly improved in both groups during the serial follow-up period ($p < 0.001$). There were no statistically significant differences between the two groups in most of the assessed clinical scores. However, the mean VAS pain score in the MUA group was significantly lower than that in the ACR group at 3 months after procedure (1.6 vs. 3.4, $p < 0.001$), and the ASES score in the MUA group was higher than in the ACR group at 3 months

after procedure (80.3 vs. 66.1, p < 0.001). There were no significant differences between the two groups in terms of preoperative forward flexion, external rotation, and internal rotation (p > 0.05). Both groups had significant improvement in the ROMs of the shoulder joint at the final follow-up compared with the preoperative ROMs (p < 0.001). In the MUA group, mean forward flexion was significantly greater than that in the ACR group at 3-months after the procedure (156.3° vs. 148.6°, p = 0.011). Mean external rotation and internal rotation were significantly greater than those in the ACR group at 3 months (60.6° vs. 38.2°, p < 0.001 and 11.0 vs 14.4, p < 0.001, respectively), 6 months (66.2° vs 51.0°, p < 0.001 and 10.4 vs. 12.3, p = 0.015, respectively), and 12 months (73.0° vs. 61.3°, p < 0.001 and 9.0 vs. 10.7, p = 0.042, respectively) after procedure. The limitations of this study included that it was retrospective, comparative study with small sample size. The authors concluded "Compared with ACR, MUA offered equivalent clinical outcomes in the early period after the procedure. MUA in patients with refractory AC can be a simple and safe procedure to improve shoulder symptoms and function within a short period of time. It can be considered as a useful treatment option before choosing ACR." Prospective, randomized, controlled trials are needed to compare the clinical, patient reported, and cost outcomes of using either MUA or ACR to treat refractory AC.

Ko et al (2021) noted that studies on the effects of manipulation under anesthesia (MUA) for primary stiff shoulder when different co-morbidities are present are lacking, and they examined how co-morbidities influence the recovery speed and clinical outcomes following MUA. Between April 2013 and September 2018, a total of 281 consecutive primary stiff shoulders in the frozen phase treated with MUA were included in this study which examined the co-morbidities of patients. The patients were divided into four groups: control (n = 203), diabetes mellitus (DM) (n = 32), hyperlipidemia (n = 26), and thyroid disorder (n = 20) groups. The ROM and clinical scores for each group before MUA and 1 week, 6 weeks, and 3 months after MUA were comparatively analyzed and the subjects were then subdivided into successful and non-successful MUA groups based on their responsiveness. Significant improvements in ROM and clinical scores at 3 months after MUA were observed in all groups. Significant differences in ROM among the 4 groups were also observed during follow-up (p < 0.05). The DM group had significantly lower ROM values, even at 3 months after MUA, compared to the control group. The ROM recovery speed after MUA was slowest in the DM group, followed by the thyroid disorder, hyperlipidemia, and control groups. Most (90.6 %) of the DM group experienced late recovery. The proportion of non-successful MUA was higher in the DM and thyroid disorder groups than that in the control and hyperlipidemia groups (p = 0.004). During follow-up, there were no differences among groups regarding the VAS, University of California at Los Angeles shoulder, and Constant scores. The authors concluded "ROM recovery speed and responsiveness to MUA for primary stiff shoulder were poorer for the DM and thyroid disorder groups than for the control group. In particular, compared to any other disease, outcomes were poorer when the co-morbidity was DM. If patients have co-morbidities, then they should be informed before MUA that the co-morbidity could affect the outcomes of treatment."

Noncomparative Observational Studies

In 2017, Woods et. al. prospectively analyzed a single-surgeon's patients who underwent manipulation under anesthesia (MUA) for recurrence of frozen shoulder. The Oxford Shoulder Scores (OSS) and range of motion (ROM) were the outcome measures. A total of 730 patients (792 shoulders) underwent MUA during the study period. Additional MUA was completed in 141 of the 792 shoulders (17.8%) for which there was completed data for 126. The mean improvement in OSS for all patient's undergoing MUA was 16 (26 to 42), and the mean post-operative OSS in those requiring a further MUA was 14 (28 to 42; t-test, no difference between mean improvements, p = 0.57). Improvement was seen after a further MUA, regardless of the outcome of the initial MUA, and of the time of recurrence. Patients with type-1 diabetes mellitus were at a 38% increased risk of requiring further MUA, compared with 18% increased risk of the group as a whole (p < 0.0001). The authors concluded "Patients with poor outcome or recurrent

symptoms of a frozen shoulder after a MUA should be offered a further MUA with the expectation of a good outcome and a low complication rate."

In 2016, Bidwai et al evaluated prospectively collected data from a single-surgeon's patients undergoing anterior capsular release (ACR) and controlled manipulation under anesthesia (MUA) in the treatment of primary frozen shoulder to asses patient related outcome measures, pre- and post-operative Oxford Shoulder Score (OSS), range of motion (ROM) and re-intervention rates. Fifty-four shoulders (52 patients) were enrolled, 17 of these patients (31%) were diabetic. Patients were followed for minimum of 6 months and a maximum of 12 months. ROM results showed improvement at 6 months ($p < 0.005$). Fifty-one patients (98%) achieved 160° of forward flexion at 6-month follow-up, with one patient only having 110°. Fifty patients (96%) of patients achieved 140° of abduction at 6-month follow-up, with one patient achieving 160° and one patient limited to 90°. Pre- and post-operative OSS showed improvement in both pain and function ($p < 0.005$). The median postoperative score was 41 from 48 points, with an average mean improvement of 24 points. All patients reported return to work and normal functional activities by 6-months. The outcomes between diabetic and non-diabetic patients were compared and there was no significant difference in preoperative or postoperative OSS or ROM between the groups. There were no post-operative complications. There were no requirements for surgical re-intervention and no cases of recurrence. Limitations of this study include small sample size with follow-up limited to a maximum of 12 months, The authors concluded "We have been able to demonstrate significant improvement in OSS and ROM for patients undergoing a limited capsular release and a controlled MUA in isolation without the need for a secondary surgical intervention. A combination of limited release along with an MUA for the treatment of primary frozen shoulder syndrome is a safe and effective procedure resulting in marked improvement in pain, function and ROM."

Section Summary

Based on review of the peer reviewed evidence that includes RCTs, nonrandomized comparative and noncomparative observational studies evaluating MUA in individuals undergoing ACR for the treatment of primary frozen shoulder. The majority these studies are limited by small sample size and short-term follow-up of 12-month, however, study results were consistent in showing that pre- and post-operative OSS showed improvement in both pain and function to include improved ROM (Woods et al 2017 and Bidwai 2016). MUA is also considered a safe procedure with minimal to no complications in the treatment of adhesive capsulitis of the shoulder.

Manipulation Under Anesthesia for Treatment of Stiffness After Total Knee Arthroplasty (TKA)

Clinical Context and Therapy Purpose

The purpose of MUA is to provide a treatment option that is an alternative to or an improvement on existing therapies, such as conservative management, in individuals with stiffness after total knee arthroplasty.

The following PICO was used to select literature to inform this review.

Populations

The relevant population of interest is individuals with stiffness after total knee arthroplasty.

Interventions

The therapy being considered is MUA.

MUA consists of a series of mobilization, stretching, and traction procedures performed while the individual is sedated (usually with general anesthesia or moderate sedation). MUA takes 15 to 20 minutes, and after recovery from anesthesia the individual is discharged with instructions to remain active and use heat or ice for short-term analgesic control.

Comparators

Comparators of interest include conservative management.

Conservative management includes steroid regimens, anti-inflammatory medications, and physical therapy.

Outcomes

The general outcomes of interest are symptoms, functional outcomes, quality of life, and treatment-related morbidity.

Study Selection Criteria

Methodologically credible studies were selected using the following principles:

- To assess efficacy outcomes, comparative controlled prospective trials were sought, with a preference for RCTs;
- In the absence of such trials, comparative observational studies were sought, with a preference for prospective studies.
- To assess long-term outcomes and adverse events, single-arm studies that capture longer periods of follow-up and/or larger populations were sought.
- Studies with duplicative or overlapping populations were excluded.

Review of Evidence

Systematic Reviews

Gu et al. (2018) conducted a systematic review of the literature to identify studies that reported clinical outcomes for patients who underwent manipulation under anesthesia (MUA) for post-operative knee stiffness following total knee arthroplasty (TKA). Repeat MUA procedures were included but were analyzed separately. Twenty-two studies (1488 patients) reported on range of motion (ROM) after MUA, and 4 studies (81 patients) reported ROM after repeat MUA. In the primary MUA group all studies reported pre-MUA motion of less than 90° and post MUA ROM of greater than 90° at final follow-up was achieved in all studies except 2. The follow-up time varied from 6 weeks to 7.5 years with a mean follow-up time of 32 months across all reporting studies. There was improvement in flexion or total ROM post-MUA vs pre-MUA in all reported studies ($p < .05$). Six studies reported complications associated with primary MUA procedure yielding a complication rate of less than 1%. In the repeat MUA group the mean repeat MUA ROM was less than 90° in all reporting studies. The mean improvement in ROM post-repeat

MUA ranged from 29° to 17.3°. Repeat MUA resulted in a mean ROM of greater than 90° in 2 of the studies. Improvement in movements were reported in 3 of the studies and one study found no significant increase in flexion after repeat MUA. Three studies evaluated the course of treatment who failed primary MUA, 5 patients required revision arthroplasty, 17 of 29 patients achieved adequate outcomes from repeat MUA, 5 patients underwent revision of the polyethylene spacer, and 7 patients underwent lysis of adhesions. Based on the data investigators found that the study indicated MUA should be preformed between 4 and 12 weeks. Limitations of this study include limited by quality of original studies, variability in inclusion criteria and methods for reporting evaluated variables, the number of patients analyzed and potential publication bias. RCTs are expected to have an important role in clarifying the effectiveness of MUA and potential combinations for therapies that could improve outcomes moving forward. The authors concluded "Overall, analysis of current studies has shown MUA to be an effective, minimally invasive treatment for stiffness in appropriate patient populations, with ideal MUA occurring between 4 and 12 weeks post-operatively and with an overall 1% rate of complication."

Nonrandomized Comparative Studies

Lim et al (2021) in a retrospective study evaluated the efficacy of manipulation under anesthesia (MUA) to determine affected clinical outcomes including range of motion (ROM) and patient satisfaction following total knee arthroplasty (TKA) in a staged bilateral TKA. Ninety-seven patients were included and analyzed. MUA of the knee flexion more than 120 degrees was performed a week after the initial surgery just prior to the operation of the second knee. The first knees with MUA were classified as the MUA group and the second knees without MUA as the control group. ROM, Knee Society Knee Score, Knee Society Functional Score, Western Ontario and McMaster Universities (WOMAC) score, and patient satisfaction were assessed. Postoperative flexion was significantly greater in the MUA group for 6 months follow-up (6 weeks: 111.6 vs. 99.8 degrees, $p < 0.001$; 3 months: 115.9 vs. 110.2 degrees, $p = 0.001$; 6 months: 120.2 vs. 117.0 degrees, $p = 0.019$). Clinical outcomes also showed similar results with knee flexion for 2 years follow-up. Patient satisfaction was significantly high in the MUA group during 12 months (3 months: 80.2 vs. 71.5, $p < 0.001$; 6 months: 85.8 vs. 79.8, $p < 0.001$; 12 months: 86.1 vs. 83.9, $p < 0.001$; 24 months: 86.6 vs. 85.5, $p = 0.013$).The authors concluded "MUA yielded improvement of clinical outcomes including ROM and patient satisfaction, especially in the early period after TKA. MUA in the first knee could be taken into account to obtain early recovery to improve patient satisfaction in staged bilateral TKA."

Pierce et al. (2017) assessed the incidence of revision TKA and outcomes of those undergoing MUA compared with a matched cohort who did not require MUA in prospectively collected database at two high-volume institutions. A total of 138 knees with a mean 8.5-year follow-up post MUA were found and compared with a matched cohort 1:1 who underwent TKA during this same time period but did not require MUA. The incidence of revision surgery and clinical outcomes were compared between the two cohorts. Within the MUA cohort, nine knees underwent revision, which was similar to the matched cohort that had seven revisions (93 vs. 95%; $p = 0.6$). The mean Knee Society Score (KSS)-functional (88 vs. 90 points; $p = 0.15$) and clinical scores (87 vs. 89 points; $p = 0.1$) were similar between the two cohorts. The authors concluded "Undergoing MUA was not associated with an increased risk of revision TKA. If patients require MUA, they may still achieve satisfactory outcomes."

Noncomparative Observational Studies

Randsborg et al (2020) assessed manipulation under anesthesia (MUA) for knee stiffness following total knee replacement (TKR) at a single institution. Eligible patients were invited to attend a designated follow-up clinic where range of motion (ROM) was measured utilizing a goniometer. Patient related range of motion (PROM) in the form of the Knee Injury and Osteoarthritis Outcome Score (KOOS), Tenger Score, Lysholm Score, and Visual Analogue Scale (VAS) score for pain sitting and standing was assessed. All

patients were referred to physiotherapy. At this center 1071 patients underwent primary TKR of these 24 patients (17 woman and 6 men) underwent MUA due to knee joint stiffness (median time from TKR to the MUA was 127 days), and 23 of these patients (17 women) volunteered to participate in this study and were examined on average 2.5 years after the manipulation. The median total ROM was 97° (r, 84°-116°) at the time of follow-up, compared with 70° (r, 50°-80°) before the MUA (P < .001). The average improvement in the total ROM was 35° (standard deviation, 28°). Flexion ≥ 90° was achieved by 20 of 23 (87%) patients. Two patients had reduced ROM at follow-up compared with previous MUA. The median Lysholm score was 57.1 (r, 17.9-92.9) at follow-up, indicating that despite improvement in ROM, the patients did not achieve normal function of the knee joint. The KOOS reported in this study were inferior to KOOS reported by patients who underwent TKR reported to the Norwegian Arthroplasty Registry 2 years after surgery. Two patients had a repeat MUA performed because of persistent joint stiffness after the initial MUA. One of these patients suffered a tuberosities tibia fracture at the second MUA that required surgical fixation, which ultimately led to poor results (Lysholm score of 39) and a total ROM of 50°. Two patients had their TKR revised after the MUA because of persistent extension deficit over 15° after the MUA. Limitations of this study included that it was single-center retrospective study which did not compare to a matched cohort and the reviewers did not have the preoperative ROM so the changes in Lysholm Scores and KOOSs for the individual patient were not available. The main finding in the study was that ROM after the MUA for knee joint stiffness after TKR remains clinically and statistically improved on average 2.5 years after the joint manipulation, however, the patients did not achieve PROMs scores compared to those recorded by the National Arthroplasty Registry. The authors concluded “This study supports previous findings that the MUA for knee joint stiffness after TKR improves ROM in the long term.”

Section Summary

Based on review of the peer reviewed medical evidence regarding MUA for the treatment of knee joint stiffness after TKA which includes systematic review, nonrandomized comparative and noncomparative observational studies. In Randsborg et al 2020 it was noted that MUA for stiff knee joint post TKR is an established treatment and there is a general consensus that MUA leads to a better ROM both in the short and long term. In this observational study they found clinical and statistical improvement in the ROM of 35° at a mean follow-up of 26.4 months and 87% of the patients achieved flexion of more than 90° flexion, which supports previous findings that MUA for joint stiffness after TKR improves ROM in the long term. In the systematic review by Gui et. al. (2018) the investigators found that the overall analysis of the current studies found MUA to be effective in improving ROM (KOOS scores) and patient satisfaction with improved VAS scores, in appropriate patient populations, with ideal MUA occurring between 4 and 12 weeks post-operatively and with an overall 1% rate of complication.

Manipulation Under Anesthesia for the Treatment of Temporomandibular Joint (TMJ) Pain

Note: For *Surgical Treatment for reduction of fracture or dislocation of TMJ, see medical policy* 02.01.21 Temporomandibular Joint (TMJ Dysfunction: Diagnosis and Treatments

Clinical Context and Therapy Purpose

The purpose of MUA is to provide a treatment option that is an alternative to or an improvement on existing therapies, such as conservative management, in individuals with temporomandibular joint (TMJ) pain.

The following PICO was used to select literature to inform this review.

Populations

The relevant population of interest is individuals with temporomandibular joint (TMJ) pain.

Interventions

The therapy being considered is MUA.

MUA consists of a series of mobilization, stretching, and traction procedures performed while the individual is sedated (usually with general anesthesia or moderate sedation). MUA takes 15 to 20 minutes, and after recovery from anesthesia the individual is discharged with instructions to remain active and use heat or ice for short-term analgesic control.

Comparators

Comparators of interest include conservative management.

Conservative management includes anti-inflammatory medications, muscle relaxants, eating soft foods, heat and cold packs, physical therapy and mouth guard or another non-permanent appliance.

Outcomes

The general outcomes of interest are symptoms, functional outcomes, quality of life, and treatment-related morbidity.

Study Selection Criteria

Methodologically credible studies were selected using the following principles:

- To assess efficacy outcomes, comparative controlled prospective trials were sought, with a preference for RCTs;
- In the absence of such trials, comparative observational studies were sought, with a preference for prospective studies.
- To assess long-term outcomes and adverse events, single-arm studies that capture longer periods of follow-up and/or larger populations were sought.
- Studies with duplicative or overlapping populations were excluded.

Review of Evidence

Noncomparative Observational Study

The available evidence for manipulation under anesthesia (MUA) for temporomandibular joint syndrome is limited to a small, prospective study with limited follow-up Foster et al. 2000. There were 55 patients that participated in this study and the investigators reported that of these 55 patients, 15 improved, 6 showed partial improvement, 15 did not show improvement and 19 were not treated. The median pre-treatment opening was 20mm (range 13-27). Among those who improved after manipulation, the median opening after treatment was 38mm (range 35-56). Some of these patients experienced a return of TMJ

clicking but not of joint or muscle tenderness. The authors concluded “MUA may help some patients with disc displacement without reduction.”

Section Summary

The available evidence for MUA for temporomandibular joint syndrome is limited to small, prospective noncomparative observational study with limited follow-up. Out of 55 patients that were treated, 15 patients showed improvement and 6 patients showed partial improvement of pre-treatment opening 20 mm (range of 13 to 27) to post MUA with a median opening of 38 mm (range of 35 to 56). While this study may show promise there is paucity of evidence supporting the use of MUA in the treatment temporomandibular joint syndrome, based on the current peer reviewed medical evidence there is no controlled studies or studies reporting long-term follow-up with outcomes. The evidence is insufficient to determine the effects of the technology on net health outcomes.

Manipulation Under Anesthesia for the Toe Following Metatarsophalangeal Joint (MTPJ) Surgery

Clinical Context and Therapy Purpose

The purpose of MUA is to provide a treatment option that is an alternative to or an improvement on existing therapies, such as conservative management, in individuals stiffness of the toe following first metatarsophalangeal joint (MTPJ) surgery.

The following PICO was used to select literature to inform this review.

Populations

The relevant population of interest is individuals with stiffness of the toe following first metatarsophalangeal joint (MTPJ) surgery.

Interventions

The therapy being considered is MUA.

MUA consists of a series of mobilization, stretching, and traction procedures performed while the individual is sedated (usually with general anesthesia or moderate sedation). MUA takes 15 to 20 minutes, and after recovery from anesthesia the individual is discharged with instructions to remain active and use heat or ice for short-term analgesic control.

Comparators

Comparators of interest include conservative management.

Conservative management includes steroid regimens, anti-inflammatory medications, and physical therapy.

Outcomes

The general outcomes of interest are symptoms, functional outcomes, quality of life, and treatment-related morbidity.

Study Selection Criteria

Methodologically credible studies were selected using the following principles:

- To assess efficacy outcomes, comparative controlled prospective trials were sought, with a preference for RCTs;
- In the absence of such trials, comparative observational studies were sought, with a preference for prospective studies.
- To assess long-term outcomes and adverse events, single-arm studies that capture longer periods of follow-up and/or larger populations were sought.
- Studies with duplicative or overlapping populations were excluded.

Review of Evidence

Noncomparative Observational Studies

Ajwani et al. (2018) reported on the effectiveness of manipulation under anesthesia (MUA) and local steroid injection (mixture of depomedrone and bupivacaine) in the treatment of stiffness of the first metatarsal joint following surgery for hallux rigidus or hallux valgus. Patient records were reviewed to determine the range of motion (ROM) of the joint pre-operatively, and immediately following the procedure and at subsequent follow-up. Manchester-Oxford Foot Questionnaires (MOXFQ) were sent to patients to evaluate symptoms post-operatively. Thirty-five patients were included in this study which included a total of 38 foot operations. Twenty-seven had prior surgery for hallux rigidus and 11 for hallux valgus correction. The mean pre-manipulation total ROM was 25° (range 5–100), with total ROM of the joint following immediate post-manipulation ROM was 70° (10–180), and final follow-up ROM was 50° (10–90), which showed that movement of the joint was still improved from pre-manipulation. The mean post-operative MOXFQ score was 24.8 (out of 52) with no correlation found between MOXFQ scores and ROM. The authors concluded “MUA and local steroid injection is an effective way of treating stiffness following first surgery which results in an improved ROM in the joint.” Limitations of this study included small sample size, retrospective in nature and lack of randomization with no control or comparative groups.

Feuerstein et al. (2016) performed a medical records review study to investigate the intermediate and long-term outcomes of first metatarsophalangeal (MTP) joint manipulation under anesthesia (MUA) for arthrofibrosis that developed, specifically, as a complication of hallux valgus surgery (bunion surgery). Medical records were reviewed at the Weil Foot and Ankle Institute, IL to identify those patients who had undergone first metatarsophalangeal (MTP) joint MUA . A total of 38 patients (34 females, 4 males, 53 feet) agreed to participated and completed a research visit in which a clinical examination was performed and the presence and severity of joint pain were assessed. Before the patient’s visit, the medical records were reviewed to assess the course and timing of the procedures, visual analog scale (VAS) score before manipulation and range of motion (ROM) of the first MTP joint after hallux valgus correction and before manipulation and first MTP joint ROM immediately after manipulation. Manipulation procedures occurred at a mean 1.2 years from the date of the initial hallux valgus correction. The research visits occurred at a mean 6.5 years after the first MTP joint manipulation. The VAS scores improved from baseline to the final follow-up visit (baseline 6.5 $\pm$ 1.5, range 2 to 10; final follow-up visit 2.3 $\pm$ 1.5, range 0 to 6’ $p < .001$). Joint motion increased ($p < .001$) for both dorsiflexion and plantarflexion at the final follow-up visit. The final ROM (dorsiflexion. $r = 0.431$, $p = .002$; plantarflexion, $r = -0.494$, $p < .001$) . The authors concluded “Our

findings suggest that joint manipulation could be a useful modality for increasing first metatarsophalangeal joint mobility and alleviating the pain in patients who experience arthrofibrosis after surgical correction of hallux vulgus." Limitations of the study included the lack of randomization, lack of a control or comparison group, and potential selection bias.

Section Summary

The available evidence per review of the peer reviewed medical literature for MUA for the treatment of joint stiffness (arthrofibrosis) of the first metatarsophalangeal toe joint (MTPJ) following hallux valgus or hallux rigidus surgery consists of noncomparative observational studies. While these studies may show promise there is a paucity in the evidence which currently consists of observational studies limited to small sample sizes and lack of control and comparison groups. Currently there are no RCTs. The evidence is insufficient in determining that MUA for the treatment of joint stiffness (arthrofibrosis) of the first metatarsophalangeal toe joint (MTPJ) following hallux valgus or hallux rigidus surgery is safe and effective. The evidence is insufficient to determine the effects of the technology on net health outcomes.

Manipulation Under Anesthesia for Other Joints

Clinical Context and Therapy Purpose

The purpose of MUA is to provide a treatment option that is an alternative to or an improvement on existing therapies, such as conservative management, in individuals with chronic pain elbow, wrist, hand, finger, and ankle.

The following PICO was used to select literature to inform this review.

Populations

The relevant population of interest is individuals with chronic pain and stiffness of elbow, wrist, hand, finger, hip, and ankle.

Interventions

The therapy being considered is manipulation under anesthesia.

MUA consists of a series of mobilization, stretching, and traction procedures performed while the individual is sedated (usually with general anesthesia or moderate sedation). Manipulation under anesthesia takes 15 to 20 minutes, and after recovery from anesthesia the individual is discharged with instructions to remain active and use heat or ice for short-term analgesic control.

Comparators

Comparators of interest include conservative management.

Conservative management includes steroid regimens, anti-inflammatory medications, and physical therapy.

Outcomes

The general outcomes of interest are symptoms, functional outcomes, quality of life, and treatment-related morbidity.

Study Selection Criteria

Methodologically credible studies were selected using the following principles:

- To assess efficacy outcomes, comparative controlled prospective trials were sought, with a preference for RCTs;
- In the absence of such trials, comparative observational studies were sought, with a preference for prospective studies.
- To assess long-term outcomes and adverse events, single-arm studies that capture longer periods of follow-up and/or larger populations were sought.
- Studies with duplicative or overlapping populations were excluded.

Review of Evidence

Elbow

Noncomparative Observational Studies

In a retrospective study of a single institution, Spitler et al (2018) evaluated the safety and efficacy of manipulation under anesthesia (MUA) for post-traumatic elbow stiffness. The investigators carried out a chart review of 45 patients over a 10-year period treated with MUA for post-traumatic elbow stiffness after elbow injuries treated both operatively and non-operatively. Main outcome measures were change in total flexion arc pre- to post-manipulation; time to manipulation; and complications. Average time from most recent surgical procedure or date of injury to MUA was 115 days. Average pre-manipulation flexion arc was 57.9 degrees; average flexion arc at the final follow-up was 83.7 degrees. The improvement in elbow flexion arc of motion was statistically significant ($p < 0.001$). Post-hoc analysis of the data revealed 2 distinct groups: 28 patients who underwent MUA within 3 months of their most recent surgical procedure (early manipulation), and 17 patients who underwent MUA after 3 months (late manipulation). Average improvement in elbow flexion arc in the early MUA group was 38.3 degrees ($p < 0.001$); improvement in the late MUA group was 3.1 degree. Comparison of improvement between the early and late MUA groups found a significant difference ($p < 0.001$) in mean flexion arc improvement from pre-manipulation to post-manipulation, favoring the early group. One patient had a complication directly attributable to MUA; 19 patients needed additional procedures on the injured extremity after MUA. The authors concluded “MUA is safe and effective adjunct to improving motion in post-traumatic elbow stiffness when used within 3 months from the original injury or time of surgical fixation. After 3 months, MUA did not reliably increase elbow motion. These findings need to be validated by well-designed studies.”

Hip

Systematic Review

De SA et. al. (2016) completed a systematic review regarding adhesive capsulitis (AC) of the hip addressing the diagnosis, treatment and treatment outcomes. Ten studies were included (6 case series

and 4 case reports) with a total of 40 cases included in this review (16 males and 24 females). The mean post-operative follow-up period was 16.0 ± 7.3 months. The most common symptoms included limited ROM (17 of the 40 cases) and pain exacerbated by activity/weight bearing (8 out of the 40 cases). Other forms of symptomatic pain included insidious (five cases), progressive (four cases), traumatic (three cases), acute (three cases), sporadic/intermittent (two cases), constant/persistent (two cases) and nocturnal (one case). Arthrography was used in 25 out of 40 cases, and was the most common tool in the diagnosis of AC of the hip. Common treatments included pressure dilation in 11 cases (most commonly using arthrography contrast medium) and MUA 11 cases. Arthroscopy was used in conjunction with MUA in nine cases and synovectomy and total hip arthroplasty (THA) were less frequently reported (4 cases each). The most commonly reported outcomes were decreased pain, ROM improvements and recovered articular capacity upon follow-up, however, the majority of the studies did not utilize a validated outcome measurement tool to report results and reported a subjective statement regarding the general pain relief and ROM improvements reported by the patient. For cases that did measure outcomes, internal rotation, external rotation, flexion and abduction were the most commonly reported ROM measurements, while VAS was the most common pain measurement used. For patients with ROM measurements recorded at baseline and final follow up, the mean improvements were: 20.0° ± 7.1° for internal rotation (n = 4), 17.5° ± 6.4° for external rotation (n = 4), 15.0° ± 8.7° for flexion (n = 3) and 22.5° ± 10.6° for abduction (n = 2). The mean improvement in 100 point VAS was 36.7 ± 30.6 (n = 3), and the mean Hip arthroscopy 100 point score was 28.9 ± 12.8 (n = 9). This study was limited by small sample size (n = 40) and small number of studies investigating AC of the hip likely due to the rarity of this condition. The authors concluded “AC continues to be difficult clinical entity to diagnose. Our review demonstrates that MUA and pressure dilation are the most common treatments with the literature for hip AC. There is a need for extensive research on AC of the hip to adequately understand pertinent diagnostics and appropriate treatment options.

All Other Joints Wrist, Hand, Finger, and Ankle

MUA as has also been suggested as treatment of acute and chronic conditions of other joints such as wrist, hand, finger and ankle. The current peer reviewed medical evidence includes retrospective chart reviews and single case series. There currently are no RCTs or any studies reporting long-term follow-up with outcomes. At this time there is insufficient evidence to establish the safety and effectiveness regarding MUA for other joints such as wrist, hand, finger and ankle.

Section Summary

The current peer reviewed medical evidence regarding the use of MUA for joints such as elbow, hip, wrist, hand, finger and ankle is limited to systematic review related to hip (6 case series and 6 case reports), observational study related to elbow, and retrospective chart reviews and single case series for joints related to wrist, hand, finger and ankle. There are currently no RCTs or any studies reporting long term follow-up outcomes. At this time there is insufficient evidence to establish the safety and effectiveness regarding MUA for other joints such as elbow, hip, wrist, hand, finger and ankle.

SUPPLEMENTAL INFORMATION

The purpose of the following information is to provide reference material. Inclusion does not imply endorsement or alignment with the evidence review conclusions.

Practice Guidelines and Position Statements

Guidelines or position statements will be considered for inclusion in ‘Supplemental Information' if they were issued by, or jointly by, a US professional society, an international society with US representation, or National Institute for Health and Care Excellence (NICE). Priority will be given to guidelines that are informed by a systematic review, include strength of evidence ratings, and include a description of management of conflict of interest.

Clinical Input From Physician Specialty Societies and Academic Medical Centers

2009 Input

Clinical input was sought to help determine whether the use of manipulation under anesthesia for individuals with chronic spinal and pelvic pain would provide a clinically meaningful improvement in net health outcome and whether the use is consistent with generally accepted medical practice. In response to requests, input was received from 2 physician specialty societies and 4 academic medical centers while this policy was under review. Input from the 7 reviewers agreed that manipulation under anesthesia for chronic spinal and pelvic pain is investigational.

American Academy of Orthopaedic Surgeons (AAOS)

The American Academy of Orthopaedic Surgeons (AAOS) includes manipulation under anesthesia as an option for treatment of adhesive capsulitis (frozen shoulder).

American Association of Manipulation Under Anesthesia Providers

In 2014, The American Association of Manipulation Under Anesthesia Providers published consensus-based guidelines for the practice and performance of manipulation under anesthesia. The guidelines included patient selection criteria (see below), establishing medical necessity, frequency and follow-up procedures, parameters for determining manipulation under anesthesia progress, general post-manipulation under anesthesia therapy, and safety. The guidelines recommended 3 consecutive days of treatment, based on the premise that serial procedures allow a gentler yet effective treatment plan with better control of biomechanical force. The guidelines also recommended follow-up therapy without anesthesia over 8 weeks after manipulation under anesthesia that included all fibrosis release and manipulative procedures performed during the manipulation under anesthesia procedure to help prevent re-adhesion.

Patient selection criteria include, but are not limited to, the following:

- "The patient has undergone an adequate trial of appropriate care...and continues to experience intractable pain, interference to activities of daily living, and/or biomechanical dysfunction.
- "Sufficient care has been rendered prior to recommending manipulation under anesthesia. A sufficient time period is usually considered a minimum of 4 to 8 weeks, but exceptions may apply depending on the patient's individual needs....
- "Physical medicine procedures have been utilized in a clinical setting during the 6 to 8 week period prior to recommending manipulation under anesthesia.
- "Diagnosed conditions must fall within the recognized categories of conditions responsive to manipulation under anesthesia. The following disorders are classified as acceptable conditions for utilization of manipulation under anesthesia:

1. "Patients for whom manipulation of the spine or other articulations is the treatment of choice; however, the patient's pain threshold inhibits the effectiveness of conservative manipulation.
2. "Patients for whom manipulation of the spine or other articulations is the treatment of choice; however, due to the extent of the injury mechanism, conservative manipulation has been minimally effective...and a greater degree of movement of the affected joint(s) is needed to obtain patient progress.
3. "Patients for whom manipulation of the spine or other articulations is the treatment of choice by the doctor; however due to the chronicity of the problem, and/or the fibrous tissue adhesions present, in-office manipulation has been incomplete and the plateau in the patient's improvement is unsatisfactory.
4. "When the patient is considered for surgical intervention, manipulation under anesthesia is an alternative and/or an interim treatment and may be used as a therapeutic and/or diagnostic tool in the overall consideration of the patient's condition.
5. "When there are no better treatment options available for the patient in the opinions of the treating doctor and patient."

Ongoing and Unpublished Clinical Trials

Some currently ongoing and unpublished trials that might influence this review can be located at clinicaltrials.gov.

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CODES

To report provider services, use appropriate CPT codes, HCPCS codes, Revenue codes, and/or ICD diagnosis codes.

Codes	Number	Description
CPT		
	21073	Manipulation of temporomandibular joint, therapeutic, requiring anesthesia service
	22505	Manipulation of spine requiring anesthesia, any region
	00640	Anesthesia for manipulation of the spine or for closed procedures on the cervical, thoracic, or lumbar spine

Codes	Number	Description
	27860	Manipulation of ankle under general anesthesia
	24300	Manipulation elbow under anesthesia
	27275	Manipulation of hip joint requiring general anesthesia
	25259	Manipulation wrist under anesthesia
	26340	Manipulation finger joint under anesthesia each joint
	23700	Manipulation under anesthesia shoulder joint including application of fixation apparatus (dislocation excluded)
	27570	Manipulation of knee joint under general anesthesia (includes application of traction or other fixation devices)
HCPCs		
	None	
Type of Service	Surgical	
Place of Service	Outpatient/Inpatient	

POLICY HISTORY

Date	Action	Action
June 2024	Annual Review	Policy Renewed
June 2023	Annual Review	Policy Renewed
January 2023	Annual Review	Policy Revised
January 2022	Annual Review	Policy Revised
January 2021	Annual Review	Policy Revised
February 2020	Interim Review	Policy Revised
January 2020	Annual Review	Policy Revised
January 2019	Annual Review	Policy Revised
July 2018	Interim Review	Policy Revised

Date	Action	Action
January 2018	Annual Review	Policy Revised
January 2017	Annual Review	Policy Renewed
January 2016	Annual Review	Policy Revised
February 2015	Annual Review	Policy Revised
March 2014	Annual Review	Policy Revised
April 2013	Annual Review	Policy Revised
April 2012	Literature Review	New Policy

New information or technology that would be relevant for Wellmark to consider when this policy is next reviewed may be submitted to:

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