CLINICAL PRACTICE

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An Osteopathic Manipulative Treatment (OMT) Evaluation and Treatment Protocol to Improve Gastrointestinal Function

Abstract

As a hands-on approach to patient care diagnosis and management, osteopathic manipulative medicine (OMM) can be utilized to modulate the autonomic input to the gastrointestinal system. Palpatory findings of tissue texture changes at predictable body regions may correspond to visceral dysfunction related to the gastrointestinal (GI) system.1 Osteopathic manipulative treatment (OMT) of the viscero-somatic segment or viscero-visceral reflex can remove the feedback related to the somatic or visceral component, thereby affecting nociceptive facilitation at the spinal or visceral level and helping to restore autonomic balance.1, 2

The purpose of this thesis is to describe an evaluation and treatment protocol to address somatic and visceral dysfunction found in many patients with impaired gastrointestinal function. A retrospective analysis of 5 patients will be outlined using the evaluation and treatment protocol. The safety of an OMT evaluation and treatment protocol as applied to address gastrointestinal function and as outlined in the current literature will also be addressed.

Introduction

Improved bowel function for patients with impaired gastrointestinal function is needed in both inpatient and outpatient management. Inpatient postoperative recovery following gastrointestinal surgery or non-abdominal surgery remains a major concern. The estimated costs of postoperative recovery in the United States are around $750 million to $1 billion dollars per year. Development of post-operative ileus can lead to prolonged hospital stays, increased morbidity, and added costs.3, 4 Despite the frequency of gastrointestinal dysfunction postoperatively, data is limited, because of a lack of well-designed trials to guide treatment. Therapy is limited to supportive care, fluid and electrolyte replacement, bowel rest, and serial abdominal examination. In addition, providing time for the gastrointestinal tract to begin functioning on its own can be lengthy, costly, and may increase risks related to longer hospitalization stays.3, 4

From an outpatient perspective, physicians are often limited by pharmaceutical options or dietary recommendations for management of gastrointestinal disorders, including functional gastrointestinal disorders.4, 5, 6 Functional gastrointestinal disorders are defined by an abnormality of GI function characterized

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by chronic or recurrent symptoms in the absence of other structural or biochemical abnormalities.7 Functional gastrointestinal disorders include irritable bowel syndrome, frequent abdominal pain, chronic constipation, chronic diarrhea, dyspepsia and gastroesophageal reflux, which account for up to 40% of gastrointestinal referrals.7

Challenges of addressing GI concerns with OMT

Although standardized OMT protocols are at times avoided in clinical studies, as a clinician and an assistant professor working with osteopathic medical students, residents and preceptors, this author has found that these individuals frequently do not know how to address common gastrointestinal concerns from an osteopathic evaluation and management perspective, such as postoperative and functional gastrointestinal issues, despite many well written books, chapters and courses on visceral manipulation.8, 9 In addition, several reports in the current literature provide examples of treatment for return to bowel function following surgery using OMT; however, only one trial described the treatment techniques utilized in the trial.4, 10, 11, 12 The use of OMT for the prevention and management of postoperative ileus was first described in a retrospective cohort study by Herrmann in 1965. The study found the prevalence of ileus in 317 patients who received OMT postoperatively was 0.3%, while the prevalence of ileus in 92 patients who did not receive OMT was 7.6%.10 In a second retrospective cohort study, Crow and Gorodinsky demonstrated that OMT following gastrointestinal surgery was associated with a 2.8 day shorter length of stay among patients with postoperative ileus than the non-OMT control group.11 A third retrospective study by Baltazar et al found OMT applied after major gastrointestinal surgery was associated with decreased time to flatus and decreased hospital length of stay.12 A randomized controlled pilot trial was conducted in 2016 which showed lower postoperative morbidity in patients who received postoperative OMT over control patients who did not receive postoperative OMT. OMT was also shown to decrease pain experienced by the patients. Despite the effectiveness of OMT applied after gastrointestinal or other surgical operation, only Probst et al described the treatment techniques utilized in the study.4 The purpose of this thesis is to describe an evaluation and treatment protocol to address somatic and visceral dysfunction found in many patients with reduced gastrointestinal function.

Method

GI Function Evaluation and Treatment Protocol

1. Thoracic/Lumbar Facilitated Segment (T5-L2)
2. Innominates/Pelvis
3. Sacrum
4. Abdominal Sphincter Motility
5. Collateral Sympathetic Ganglia
6. Thoracoabdominal Diaphragm
7. Sibson's Fascia/Thoracic Inlet
8. Occipitoatlantal (OA) Decompression

Gastrointestinal Function Evaluation and Treatment Protocol Rational

The aim of the treatment is to remove structural impediments to optimal gastrointestinal functioning, promote normalization of the body's processes, and reduce symptoms. The techniques in this evaluation and treatment protocol are from current osteopathic literature and can be taught relatively easily to medical students, residents, and practitioners with a general background of osteopathic training. Specific rationale for each treatment area is as follows.

1. Thoracic/Lumbar Facilitated Segment (T5-L2). Sympathetic innervation to the gastrointestinal tract originates from T5-L2 (stomach T5-9, liver and gallbladder T9, pancreas T5-11, small intestine T9-11, ascending and transverse colon T10-12, descending colon and rectum L1-2).[8, 13, 14] The spinal cord at these levels can become facilitated from increased and prolonged visceral afferent input. Hyperactivity of the sympathetic nervous system is associated with decreased and slowed GI motility, leading to symptoms such as gastroparesis, abdominal distension, constipation, and ileus. Removing dysfunctions at the spinal vertebral levels and moderating sympathetic tone is essential to restoring a state of autonomic balance in the gastrointestinal system.[1, 8, 13, 14]

2. Innominates/Pelvis. Addressing somatic dysfunction of the innominates can help to improve mobility and function of the bony pelvis and attachments of the pelvic diaphragm, which are important to relieve congestion in the pelvis and support ease of defecation. Furthermore, the sacroiliac joint incorporates sacral segments (S1-3), which has overlap with the bony outlet of the pelvic splanchnic nerves (S2-4) providing parasympathetic innervation to the descending colon and rectum.[8, 13, 14]

3. Sacrum. Parasympathetic innervation to the descending colon and rectum originates from pelvic splanchnic nerves (S2-4). As above, the sacroiliac joint includes sacral segments (S1-3) and can affect the bony outlet of S2-4 (pelvic splanchnic nerves). Stimulation of the parasympathetic division will increase the secretion rate of almost all gastrointestinal glands. Parasympathetic dominance can lead to complaints of headaches, nausea, vomiting, diarrhea, and cramping. Reducing sacral somatic dysfunction can address aberrant parasympathetic tone and further restore autonomic balance to the gastrointestinal system.[1, 8, 13, 14]

4. Abdominal Sphincter Motility. Motility of the abdominal sphincters, or inherent motion, is palpated as the kinetic expression of the tissue in motion. The goal of treating the abdominal sphincters is to normalize the smooth muscle tone of the sphincters located at transitional areas through the gastrointestinal tract (the ileocecal valve, the duodenojejunal junction, the sphincter of Oddi, the pylorus, and the gastroesophageal junction) and promote improved mobility and motility of the junctional regions and small intestine.[8, 14, 16]

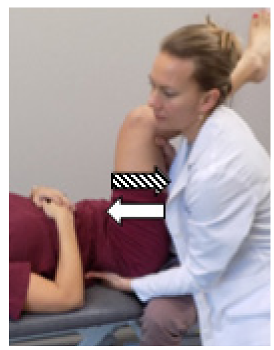
5. Collateral Sympathetic Ganglia. Sympathetic pathways to the abdominal organs include unpaired, prevertebral ganglia: the celiac, superior mesenteric and inferior mesenteric ganglia. The celiac ganglion receives preganglionic nerve fibers from T5-T9 and supplies postganglionic sympathetic axons to the distal esophagus, stomach, proximal duodenum, liver, gallbladder, spleen, and portions of the pancreas. The superior mesenteric ganglion receives preganglionic nerve fibers from T10-T11 and supplies postganglionic sympathetic axons to the distal duodenum, jejunum, ileum, cecum, ascending colon, and proximal 2/3 of the transverse colon, kidneys, adrenals, and portions of pancreas. The inferior mesenteric ganglion receives preganglionic nerve fibers from T12-L2 and supplies postganglionic sympathetic axons to the distal 1/3 of the transverse colon, descending colon, sigmoid colon, and rectum.[8, 13, 14] Visceral afferent activity can cause palpable tissue changes at the levels of these collateral ganglia in the anterior abdominal midline prior to the patient noticing symptoms. Addressing somatic changes of the collateral ganglia related to visceral afferent activity can moderate sympathetic tone and help restore autonomic balance.[1, 8, 13, 14]

6. Thoracoabdominal Diaphragm. Attachments of the thoracoabdominal diaphragm include the posterior surface of the xyphoid process, ribs 6-12 bilaterally, and the bodies, discs and anterior longitudinal ligament of L1-L3.[8, 23] Lymphatics from the GI tract include the small lymphatic channels of the organs and mesenteries which drain into the cisterna chyli located at the right crus of the diaphragm at the level of the first two lumbar vertebrae.[23] Oxygen supply to abdominal tissues is via the abdominal aorta and its descending branches, including the celiac, the superior mesenteric and inferior mesenteric arteries. Removing restrictions of this muscle allows for increased mechanical pumping of the gastrointestinal arterial and lymphatic fluids.[8, 13, 14, 23]

7. Sibson's Fascia/Thoracic Inlet. The cisterna chyli is the start of the thoracic duct which has a terminal drainage location at the fascia of the left thoracic inlet.[14] Sibson's fascia/the thoracic inlet is located at the junction of the first thoracic vertebrae, the first rib, and the manubrium where, as it pertains to the lymphatics of the GI tract, the left thoracic duct drains into the left subclavian vein before returning to the heart.[14] Treatment of the thoracic inlet removes fascial restrictions, improves tissue drainage, and in turn, removes inflammatory mediators and exudates carried up from the GI tract.[8, 14]

8. Occipitoatlantal (OA) decompression. The OA joint lies in anatomic proximity to the vagus nerve as it exits the skull through the jugular foramen formed by the temporal and occipital bones. The vagus nerve supplies parasympathetic innervation to the gastrointestinal tract from the stomach to the transverse colon. As noted above, stimulation of the parasympathetic division will increase the secretion rate of almost all gastrointestinal glands, while impaired or inhibited parasympathetics can contribute to decreased and slowed GI motility. Removing restriction at the OA joint and/or occipital condyles can help restore balance to the parasympathetic tone and other autonomics.[8, 13]

OMT for Gastrointestinal Function Evaluation and Treatment Protocol

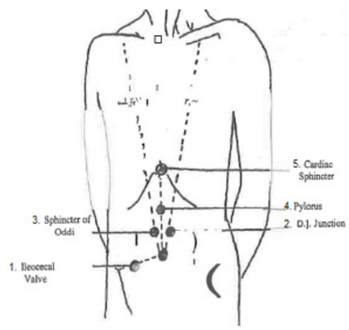
Body region and suggested technique	**Steps of the technique (All treatments were performed supine)**	**Photos**
Thoracic/Lumbar Facilitated Segment (T5-L2) (BLT)	• The physician contacts the spinous processes of the region of the facilitated segment in the thoracic or lumbar spine (T5-L2) • A point of balanced ligamentous tension is achieved using rotation, flexion/extension and sidebending of the facilitated segment • This position is maintained until tissue relaxation occurs across all planes of motion and integration with segments above and below is noted • Recheck	
Anterior Innominate (Muscle Energy)	• Hip on side of dysfunction is flexed to 90 degrees and patient's flexed knee is placed on the physician's shoulder • The physician monitors the affected sacroiliac (SI) joint as the patient's hip is flexed to motion at the SI joint • Patient is instructed to extend the affected hip gently for 3-5 seconds • After relaxation, the physician takes the innominate to a new barrier (motion felt again at the SI joint) and forces are repeated 3-5 times • Return to neutral and recheck	 Striped arrow shows patient's force isometrically resisted by the physician. White arrow show physician's force.
Posterior Innominate (Muscle Energy)	• Hip on side of dysfunction is extended off the edge of the table • The physician stabilizes the opposite ASIS to secure the pelvis • The physician's other hand exerts a downward force on the affected thigh and engages a motion barrier • The patient is asked to gently bring the knee toward the same shoulder while the physician resists isometrically • After relaxation, the physician takes the innominate to a new barrier and forces are repeated 3-5 times • Return to neutral and recheck.	 Striped arrow shows patient's force, isometrically resisted by the physician, as they bring their knee towards to ipsilateral shoulder.

Body region and suggested technique	Steps of the technique (All treatments were performed supine)	Photos

Abdominal Sphincter Motility

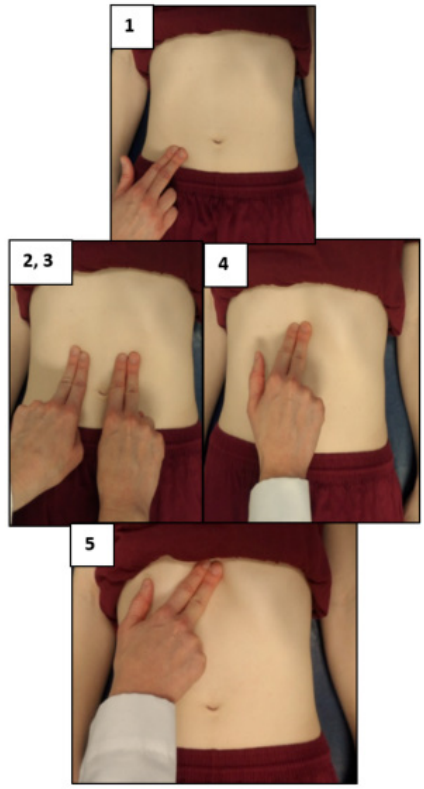
- Using the 2nd and 3rd finger pads, the physician assesses inherent motion of clockwise or counterclockwise rotation for all 5 sphincters:

  1. Ileocecal valve located 1/3 of the way on a line from R ASIS to umbilicus (McBurney's point), then just superior
  2. Dudodenal-jejunal (DJ) junction located on a line from L mid-clavicle to umbilicus, then 2-3 cm on line up from umbilicus
  3. Sphincter of Oddi located on a line from R mid-clavicle to umbilicus, then 2-3 cm on line up from umbilicus
  4. Pylorus located 6-7 cm above umbilicus
  5. Gastro-esophageal (GE) junction located just inferior to xiphoid process

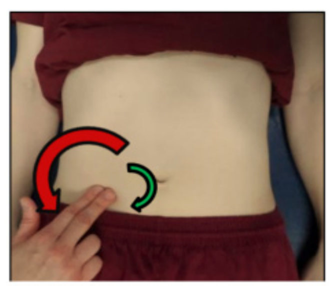


Drawing by Jean-Pierre Barral DO

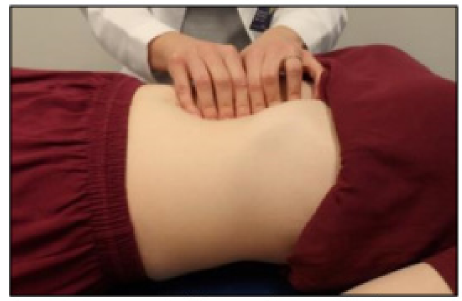
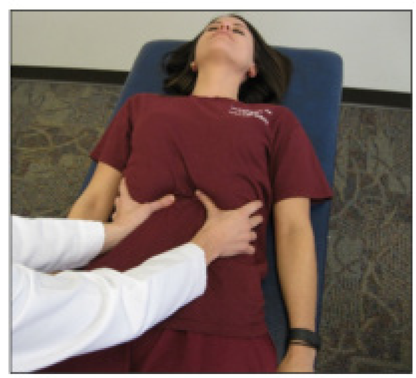
- Abdominal sphincters have a perpetual clockwise/counterclockwise movement that can be felt in the coronal plane. Physiologic movement is clockwise.
- If one or more sphincters are found to be dysfunctional (counter clockwise motion), using a small amount of pressure, fascially load the dysfunctional sphincter and follow it indirect (counterclockwise) until it pulls you back clockwise
- Recheck all sphincter motion.

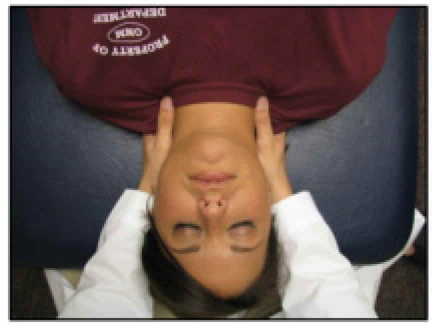
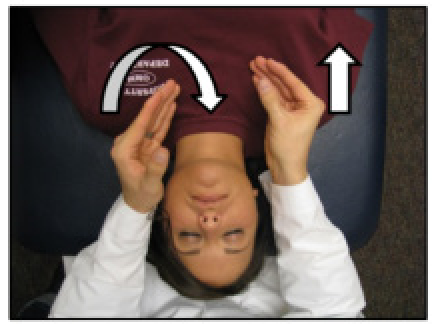
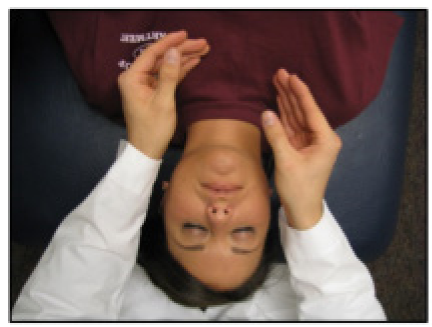


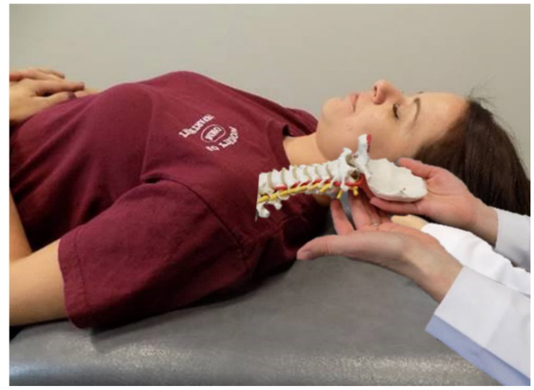
1. Ileo-cecal Valve
2. Dudoeodenal-Jejunal Junction (left)
3. Sphincter of Oddi (right)
4. Pylorus
5. Cardiac/GE Junction



Larger RED arrow demonstrates dysfunctional counterclockwise motion. Smaller GREEN arrow demonstrates active functional motion.

Body region and suggested technique	Steps of the technique (All treatments were performed supine)	Photos
Collateral Sympathetic Ganglion	• The physician spreads fingers of both hands in the midline of the patient's abdomen over the facilitated ganglia • Gently sink in over the superior (celiac ganglion location), middle (superior mesenteric location) and inferior (inferior mesenteric location) on thirds of linea alba to test for tissue resistance • When resistance over a ganglion is found, focus your treatment over this region and follow the tissues posteriorly until a new point of resistance is met • Maintain until relaxation of the resistance is achieved and ideally motion is felt through the whole line of the linea alba • Recheck	 **Physician places finger pads along midline between xiphoid and umbilicus.**  **Pressure is directed posteriorly matching the tissue tension.**
Thoracoabdominal Diaphragm (MFR)	• Place hands on the rib cage bilaterally with thumbs contacting the inferior surface of the anterior costal margin and fingers along the side of the rib cage • Assess for myofascial restrictions in each hemidiaphragm, noting the more restricted side with flexion/extension, rotation, and/or sidebending • Performing indirect myofascial release, move the abdominal diaphragm to the position of ease and wait for a softening of the tissues. • Follow the myofascial motion back to a neutral position • Recheck	

Body region and suggested technique	Steps of the technique (All treatments were performed supine)	Photos
Sibson's Fascia/ Thoracic Inlet (MFR)	• Place hands in a pincer grasp with fingers posteriorly contacting the transverse processes of T1 and posterior rib 1 while thumbs contact the superior portion of both first ribs • Assess sidebending, rotation, and flexion/ extension of the thoracic inlet with myofascial motion testing • Move into an indirect position of ease or direct position and wait for a softening of the tissues • Follow the myofascial motion back to a neutral position • Recheck	A.  B.  C.  Indirect (B.) and Direct (C.) treatments of Thoracic Inlet that is rotated and sidebent right. White arrows represent the physician's force.

Body region and suggested technique	Steps of the technique (All treatments were performed supine)	Photos
Occipitoatlantal (OA) Decompression (BLT)	• Support the head with one hand placed under the occiput with the middle finger parallel to the spine • Instruct the patient to tuck his/her chin gently to bring the posterior tubercle of C1 posterior • Place one finger of the other hand on the posterior tubercle of C1 to stabilize • Assess for motion and diagnosis of flexion/extension, rotation, and sidebending at the OA joint • A point of balanced ligamentous tension is found using rotation, flexion/extension and sidebending • This position is maintained until tissue relaxation occurs across all planes of motion and integration with motion at C1 is noted • Recheck	

Report of Cases

The following 5 cases were treated with the above evaluation and treatment protocol to improve gastrointestinal function. Focused case histories and focused physical examinations are outlined. All patients were treated with OMT following appropriate verbal consent. If body regions within the evaluation protocol were found to be without significant dysfunction, the area was not treated. The IRB excludes case series of 5 or fewer patients from review.

Case 1: GERD and hiatal hernia

A 68-year-old female presented with gastroesophageal reflux disease (GERD) and history of hiatal hernia. She had been on a proton pump inhibitor (PPI) for 25 years and had a desire to come off the medication, but when she would reduce the dosage of Dexilant 60 mg to 30 mg, she would experience rebound GERD effects. She had also tried to reduce gluten in her diet without success of symptom improvement. Abdominal exam revealed no guarding or rebound tenderness and was soft and non-distended. Osteopathic structural exam at the initial visit revealed: T5-9 NRrSl; counterclockwise rotation of GI system, including ileocecal valve, pylorus and GE junction; superior linea alba restriction; restriction of the thoracoabdominal diaphragm at the xyphoid; OA ESrRl; L2-3 NRrSl; right on right forward sacral torsion. Upon her return visit 3 weeks later, she had been able to tolerate Dexilant 30 mg (over 60 mg). Osteopathic structural exam at this visit revealed: restriction of flexion/extension and rotation T9-L2; OA FRlSr; thoracic inlet FRlSl; superior linea alba restriction; counterclockwise rotation of entirety of GI system, which resolved quickly; right on right forward sacral torsion. Upon a third visit 3 weeks following the second visit (6 weeks following the initial visit), she had been able to come off the PPI entirely. Osteopathic structural exam revealed counterclockwise rotation of pylorus, slight superior linea alba restriction; right posterior innominate rotation; right on right forward sacral torsion; AA Rr.

Case 2: Bowel obstruction and constipation

A 66-year-old-female presented with intermittent bowel obstructions for 3 years following total abdominal hysterectomy with bilateral salpingo-oophorectomy (TAH-SBO). History of stage 3B ovarian cancer; surgery included TAH-SBO, appendectomy, omentectomy, and radical dissection. She had also been treated with chemotherapy. Following her surgery, she began having intermittent bowel obstructions. She stated the constipation issues did not begin until 8 months after her surgery. Every 3 months for 3 years, she would have a significant bowel blockage. She states she would have writhing pain and would end up in the emergency department for pain management and support. She presented on Miralax twice daily and lactulose 3 times daily. Abdominal exam revealed no guarding or rebound tenderness and abdomen was soft and non-distended. Initial osteopathic structural exam revealed facilitation of T6-L2 with boggy tissue texture changes and decreased flexion/extension and rotation; right on left backward sacral torsion; restriction of superior 1/3 of linea alba; counterclockwise rotation of all sphincter motions; OA ESrRl; left posterior innominate rotation. One week later, osteopathic structural findings found a right hemidiaphragm restriction; notably less facilitation of T6-L2, T10-12 NRrSl; right on right forward sacral torsion; fascial pull of abdomen posterior at xyphoid; T1 RrSr. The patient continues to receive treatment on a 3-month basis and has been able to lengthen the time between intermittent bowel obstructions.

Case 3: Diffuse abdominal pain

A 53-year-old male presented with diffuse abdominal pain for 2 years. He stated he had gone hiking at the time and suffered from dehydration and constipation. He had since recovered from the dehydration and constipation, but had continued to have the daily abdominal pain, not worse with food consumption. He underwent an upper GI study and several colonoscopies that were reportedly normal. He had done a recent food allergy study, which showed he was allergic to wheat, corn, and beef. He had been sticking to the food allergy diet and had increased his hydration significantly. No caffeine or alcohol consumption. He ate a whole-food, unprocessed diet. He reported no current issues with constipation, had a daily formed bowel movement. He also reported increased depression associated with his stomach pain. Abdominal exam revealed no guarding or rebound tenderness; however, he did have epigastric tenderness. Bowel sounds were present in all 4 quadrants. Initial osteopathic structural exam revealed T5-L1 preferred extension with decreased rotation; significant tenderness of the diaphragm at the xyphoid process, significant restriction of superior linea alba; counterclockwise rotation of GE junction, pylorus; right on left backward sacral torsion; OA ESlRr. One week after the initial visit, symptoms were similar, with osteopathic structural exam findings that showed continued T5-L2 preference for extension; right on left backward sacral torsion; counterclockwise rotation of pylorus; slightly less tension at xyphoid process, although still notably tender; improved motion at OA FSlRr. Structural findings revealed improved parasympathetic tone as evidenced by improved motion at the OA, although sympathetic tone remained elevated as evidenced by continued restricted range of motion through the thoracic and lumbar regions. Two weeks later (3 weeks following the initial visit), the patient returned and noted some good improvement with decreased abdominal symptoms, also improved mood and decreased negative thoughts. Osteopathic structural exam found improved clockwise motion of the GI sphincters throughout; residual tension of superior linea alba; notably improved sympathetic tone with decreased facilitated changes through thoracics and lumbars; OA FSrRl (easily treated); T1 ERSl; good motion of sacrum with right on right forward sacral torsion.

Case 4: POTS, vomiting, vagotonia

A 19-year-old female with history of postural orthostatic tachycardic syndrome (POTS) and Ehlers Danlos Syndrome (EDS) presented with symptoms including daily vomiting; constipation; daily headaches; chronic fatigue; arthralgias of wrists, hands, ankles, neck; hand and feet swelling; and poor sleep with symptoms at an overall level of 7/10. She had been unable to attend college classes due to her level of symptoms. Initial osteopathic structural exam revealed significant autonomic imbalance with counterclockwise rotation of all GI sphincters; L2, L3 ant TP right; compression of left greater than right occipital condyles; decreased flexion/extension and rotation of T5-L5; decreased flexion/extension of sacrum; right innominate inflare. After 1 year of treatment with visits on a 6-week basis, the patient's overall quality of life has improved dramatically with notably less vomiting, improved tolerance for activity and improved sleep with symptoms at a 3/10 on a regular basis. She has been able to return to college. Recent osteopathic structural exam (within one year of beginning treatment) revealed OA ESrRl; R hemidiaphragm restriction; T2-4 NRrSl; improved motion of lumbars and sacrum; clockwise motion of GI system.

Case 5: Gastroparesis

A 64-year-old female with history of narcotic bowel syndrome (following narcotic abuse for 7 years, clean for past 3 years), small intestinal bacterial overgrowth syndrome, IBS, depression, and anxiety presented for evaluation of gastroparesis and GERD symptoms. Abdominal exam showed a soft abdomen with no guarding or rebound. Initial osteopathic structural findings revealed decreased flexion/extension and rotation of T7-L5 and sacrum; right on right forward sacral torsion; right innominate anterior rotation; fascial restriction of the linea alba middle and inferior 1/3; counterclockwise rotation of ileocecal valve, sphincter of Oddi; OA ESrRl. On follow up 2 weeks after the initial evaluation, she noted overall improvement and stated she was able to eat more food. She still experienced slowed GI motion; however, felt like food was moving "much more easily" through her colon. Osteopathic structural findings revealed restriction of superior and inferior mesenteric ganglion, thoracoabdominal diaphragm flattened; T7-L2 decreased flexion/extension and rotation (although easier to treat); OA FRlSr; left on left forward sacral torsion. The patient continues to be seen on an 8-10 week basis to help with continued improvement related to the chronicity of her gastroparesis and other co-morbidities.

Safety Considerations

Several large prospective clinical trials have been able to demonstrate the safety of OMT as a medical procedure.[17, 18, 19] Degenhardt et al published recent survey findings in 2018 from over 880 patients and greater than 1800 office visits with clinicians utilizing OMT.[20] Adverse events found were mild, most commonly including pain or discomfort, and no serious adverse events (SAEs) were reported.[20] A retrospective review of articles from 1925 to 1993 looked at the safety of osteopathic manipulation and found SAEs from an OMT encounter occurred so infrequently that it would be cost prohibitive to design a randomized, placebo-controlled clinical trial for investigation, as the trial would require thousands of OMT patient encounters.[21] The safety of an OMT protocol following major abdominal surgery was examined specifically in the OMANT pilot trial.[4] Probst et al used postoperative morbidity and pain as markers of safety of OMT.[4] Postoperative morbidity was measured using the comprehensive complication index (CCI). The CCI was determined within the study not to be higher in the intervention group over the control group, demonstrating the safety of OMT and pain experienced by the participants was decreased with OMT. The authors concluded OMT could be considered safe and recommended that other researchers use morbidity and pain as parameters of safety for future studies utilizing OMT.[4]

Discussion

Much research has been done to report the effectiveness of osteopathic manual medicine on low back pain, including the "AOA guidelines for OMT for patients with low back pain" as described by the Task Force on the Low Back Pain Clinical Practice Guidelines.[22] As outlined above, a notably smaller body of research has shown empirical evidence that OMT can be effective in patients with gastrointestinal dysfunction. Andrew Taylor Still, MD, DO argued that "a detailed physical examination, followed by a well-designed manipulative treatment often removes impediments to motion and function." He felt this approach should be used for any patient's concern before deciding that the body has failed in its own efforts.[15]

In the present case series, 5 of 5 patients were safely and effectively treated with common and less common gastrointestinal disorders and some with concomitant co-morbidities. The aim of this thesis is to outline an OMT evaluation and treatment protocol for learners of osteopathic manipulation at all stages, including medical students, residents, and practicing physicians, to consider when approaching patients with gastrointestinal dysfunction before deciding that such patients' systems have failed in their own efforts. Although this evaluation and treatment protocol may seem intuitive to those experienced in the practice of using and applying osteopathic manipulation, those who do not fall into this category appreciate an outline from which to start.

As shown in the above case series, not all the listed body regions need to be addressed at all visits, hence, an *evaluation* and treatment protocol; the same osteopathic principles and practices apply whether the patient presents with 1 gastrointestinal complaint, multiple gastrointestinal complaints, or a variety of system complaints in addition to the gastrointestinal concern. Addressing *some* elements to improve autonomic imbalance; restoring circulation, lymphatics, and nerve flow; and removing structural impediments to motion and function can make a change in the patient's system. If a body region is found to have reasonable mobility and motility, continue with the assessment of other body regions. Furthermore, the treating physician is encouraged to treat body regions beyond the above list if that body region appears to be an important element for the treatment process at hand. It is up to the discretion of the treating physician to determine length and breadth of treatment according to allowable time and health status or reserves of the patient. In addition, the treatment styles outlined are found to be efficient and effective for this author. Other treatment styles can be utilized depending on the treating physician's preference, experience, and office set up.

Conclusion

The evaluation and treatment protocol described in this thesis is intended to allow a physician or physician-in-training with basic-to-moderate osteopathic manipulative experience the opportunity to address key body regions and viscera, promoting improved gastrointestinal motility and function. It is this author's hope that future studies will be done with objective measures and a larger study population to further delineate the relationship between the above OMT evaluation and treatment protocol and specific therapeutic benefits for patients with gastrointestinal dysfunction. In the meantime, this author recommends a detailed physical examination, including an osteopathic structural evaluation, followed by a well-designed osteopathic manipulative treatment, such as outlined above, should be considered as a primary treatment option for patients, rather than an adjunct treatment to medical care.

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