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Research report

Does osteopathic manipulative treatment (OMT) improves outcomes in patients who develop postoperative ileus: A retrospective chart review

W. Thomas Crow*, Lilia Gorodinsky [a]

Integrated Family Medicine and Neuromusculoskeletal Residency Program, Department of Medical Education, Florida Hospital East Orlando, 7975 Lake Underhill Road, Suite 210, Orlando, Florida 32822, USA

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Abstract

Introduction: The treatment of ileus has been estimated to cost the United States $750 million to $1 billion in a year. In a study by Bennett-Guerrero et al. on 1056 patients who had major non-cardiac surgery, the most frequent problem that delayed discharge was persistent postoperative GI tract dysfunction in 42% of patients. Despite its huge cost to our society, there have been very few advances in our approach to treatment of ileus. Upon reviewing osteopathic literature for treatment of postoperative ileus it seemed that OMT may be of benefit to patients being treated for ileus in the hospital setting.
Materials and methods: All patients ($n = 655$) with a discharge diagnosis of ileus (ICD-9-CM International Code 530.1) between 2003 and 2006 were reviewed. There where 331 patients who had undergone abdominal surgery and were included in the study. Patient records were then divided into two groups, those who had received osteopathic manipulative treatment (OMT) and those who had not received OMT. The data for this study was analyzed using ANCOVA.
Results: An analysis of covariance (ANCOVA) computed on length of stay by group with age as the covariate indicated that the OMT patients had a significantly shorter length of stay than the no treatment group (adjusted mean = 14.6 days for the non-treatment group versus 11.8 days for the treatment group) even after controlling for age differences; $F(1,308) = 4.81$, $p = 0.029$.
Conclusion: The findings of this retrospective chart review indicate that a prospective trial including a more thorough economic cost-benefit analysis would be worthy of consideration.

Keywords: Osteopathic medicine; Manipulation; Ileus; Cost analysis; Outcomes; Cost effective

1. Introduction

Ileus impacts our society both financially and physically. The treatment of ileus has been estimated to cost the United States $750 million to $1 billion in a year.[1] Despite its huge cost there have been very few medical advances in the approach to treatment of ileus. The term 'ileus' originally meant colic due to intestinal obstruction.[2] It is characterized by an acute obstruction causing sudden pain that is paroxysmal at first, and then continuous; constipation; persistent fecal vomiting; abdominal distention and collapse. It has been known since the 1800s that there is decreased bowel motility after surgery.[2] There have been many modalities used to correct this problem which is consistent with the problem being multi-factorial in nature.[1] In a study by Bennett-Guerrero et al. on 1056 patients who had major

* Corresponding author. Tel.: +1 407 303 8683; fax: +1 407 303 8659.
E-mail addresses: thomas.crow.do@flhosp.org (W.T. Crow), lilia.gorodinsky@gmail.com (L. Gorodinsky).
[a] Tel.: +1 407 303 8683.

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non-cardiac surgery, the most frequent problem that delayed discharge was persistent postoperative gastrointestinal (GI) tract dysfunction in 42% of patients.[3,4]

1.1. Normal physiology of gastrointestinal motility

Digestion is a complex process that requires the coordination of motor and secretory activities of the GI tract. Peristalsis moves food through the GI tract and facilitates digestion via mixing food with digestive fluids. The release of secretory fluids and GI motility is coordinated by a variety of hormones and neural systems. The release of secretory fluids is controlled via local GI reflexes initiated by pH, luminal distension, osmolarity, and concentration of digestive products. When these stimuli are received, they act on receptors in the gut wall that start reactions in smooth muscles, endocrine, and exocrine glands. These stimuli can elicit excitatory or inhibitory responses at local or central levels as well as parasympathetic (primarily excitatory) or sympathetic (mostly inhibitory) response.[4]

1.2. Role of autonomic nervous system

Parasympathetic nerve stimulation increases GI motility via the vagus nerve and the pelvic splanchnic nerve (S2, S3, and S4). Sympathetic nerve stimulation decreases GI motility via the splanchnic nerve. Visceral pain is stimulated via irritation, edema, pressure, stretching, and spasms, which are monitored by pacinian corpuscles and free nerve endings located in the visceral walls. This nociceptive information is carried by visceral afferent fibers to the collateral sympathetic ganglion via the sympathetic trunk. From there, the information is relayed to the spinothalamic tract and up to the thalamus. After reaching the thalamus, it is sent on to the somesthetic cortex and then sent back via efferent fibers. This increased signaling may cause spinal facilitation of specific musculoskeletal segments, which results in somatic manifestations due to the underlying visceral dysfunction. Visceral pain is often poorly localized, vague, deep, and may be associated with a diffuse burning ache. Identifying the facilitated segments helps the clinician pinpoint more closely the area of innervation that is irritated and then use that information to correlate which organs are innervated by those regions.[5] Knowledge of anatomy and physiology allows the clinician to tailor osteopathic treatments to effected areas.

1.3. Pathogenesis

Altered GI motility (ileus) is defined by Luckey et al.[1] as a ''functional inhibition of propulsive bowel activity, irrespective of pathogenic mechanisms''. Postoperative ileus is described as ''uncomplicated ileus occurring following surgery, resolving spontaneously within 2–3 days.'' Luckey et al. report that inhibition of small-bowel motility usually recovers in 24–48 h, while colonic function recovery takes 48–72 h.[1]

1.4. Role of neurotransmitters, local factors, and hormones

There have been many neurotransmitters and peptides identified which are involved in regulation of gut motility and are therefore part of the pathogenesis of ileus. Some of these are nitrous oxide, vasoactive intestinal peptide (VIP), and substance P – all of which have been shown to act as inhibitory neurotransmitters in the gastrointestinal system.[6] Nitrous oxide collects in the GI tract when the gut is manipulated and causes bowel distention thereby contributing to the development of ileus.[4,7] Studies have demonstrated that VIP and substance P antagonists increase postoperative GI transit by blocking nitrous oxide.[7] Changes in neural reflexes are considered central in the pathogenesis of ileus. There are efferent and afferent links to the spinal cord from the sympathetic nervous system.[4]

Studies have shown that sympathetic output is a contributing factor to the development of postoperative ileus.[1] The proposed mechanism by which this occurs is the prevention of the release of acetylcholine release from excitatory fibers in the myenteric plexus. There have been studies using chemical sympathectomy with 6-hydroxydopamine that showed decreased ileus and delayed gastric emptying.[1] Eble et al. performed experiments on animals which demonstrated graphically the reduction of peristalsis with a resulting adynamic paralytic ileus.[8] Young described post-operative osteopathic manipulation to enhance recovery as follows:

> ''Hyperextension of the lumbar spine postoperatively will facilitate peristalsis of the intestines and reduce so-called ''gas'' pains. This has been proven to my own satisfaction on animals and more significantly on human patients. This is accomplished by having the patient in supine position. The operator standing or sitting by the side of the patient's bed; the hands of the operator are positioned under the patient until the spinous processes are cupped, the volar surfaces of the operator are on the opposite side to that which he is standing, and the thenar eminences are placed on the same side of the spinous processes as the operator is standing or sitting. Downward pressure is then exerted on the operator's antibrachial area (the fulcrum of force) while upward pressure is exerted by the operator's ''cupping'' hands. This produces a hyperextension of the lumbar spine. In order to obtain maximum effects, this procedure should be enacted every 3 h allowing at least 10–12 min for this part of the manipulative procedure. I have also obtained excellent results in postoperative colostomy cases in