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Chapter 7

Decreasing Post-Surgical Adhesions That Cause Recurrent Small Bowel Obstructions with a Conservative Manual Physical Therapy

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Abstract

Small bowel obstruction (SBO) is a common complication typically caused by adhesions that form after abdominal surgery, in response to inflammation associated with post-surgical healing. Adhesion formation occurs in an estimated 50-100% of abdominal or pelvic surgery patients and is the most common etiology of SBO. In the United States, adhesion-related SBO is a major health care expenditure annually.

Treatment options for adhesive SBO range from supportive care, consisting of bowel rest and intravenous fluids, to surgical intervention. While the non-invasive treatment options are effective at treating the

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current obstructive episode, the underlying cause of the obstructions – adhesions -- is not addressed. Surgical intervention is effective in treating the adhesions causing the current obstruction; however, surgery is the primary cause of adhesion formation and, thus, patients with a history of adhesion formation are at risk for developing additional adhesions and subsequent obstructions requiring additional surgeries. There continues to be research -- with limited success -- into methods of adhesion formation reduction in surgical techniques, medications and adhesion barriers.

Manual physical therapy has been demonstrated to deform adhesions within the abdomen and pelvis, allowing the pelvic and abdominal tissues and to function more normally. The manipulation of soft tissues to generate systemic functional benefits is not a new concept. In the field of osteopathic manual therapy, skilled manipulation of the soft tissues has long been believed to affect biomechanical change in adhesions such that the involved tissues exhibit increased pliability and independence of mobility. We have demonstrated a high rate of success treating post-surgical adhesions that cause recurrent obstructions. Patients report long term benefits from treatment and improvements in overall quality of life. Treatment with manual physical therapy compared to standard treatments will be discussed in the context of recurrent small bowel obstructions.

Introduction

Small bowel obstruction (SBO) is a common life-threatening complication of surgery or abdominal trauma, typically caused by adhesions that form as a normal part of the healing process. When healing from surgery or any other injury or infection occurs, an inflammatory response is initiated to recruit the cells necessary to close the surgical incision and repair the tissues. As a side effect of this inflammatory response, adhesions form in tissues at and near the surgical repair or trauma site due to the presence of collagen and scar tissue mediators. There is a large variation in not only the presentation of the adhesions- thin and filmy to vascular and innervated thick tissue- but in the predictability of severity of adhesion formation. Surgical technique and experience, exposure to dry heat, degree of organ manipulation, inherent patient inflammation, post surgical infection and lysis of preexisting adhesions have all been implicated in post surgical adhesion formation [1–6]. With no definitive molecular target for prevention of adhesion formation the development of adhesion barriers or surgical additives to prevent adhesion formation has proven to be unsuccessful thus far [7–13].

Current estimations of 50-100% of surgical patients develop adhesions after abdominal or pelvic surgery [8, 14–18]. Adhesions have been implicated in chronic pain, infertility, bowel obstruction and general dysfunction, with symptoms appearing hours to years after the initiating insult or surgery. It has been estimated that up to 30% of surgical small bowel resection patients will undergo additional surgery due to adhesions within a 10 year period based upon large studies [19]. Rates of additional surgery for chronic pelvic pain in women are similar, with most benefits of pain reduction being maintained only 12 months.

The treatment guidelines for partial ASBO in the absence of bowel strangulation and peritonitis is supportive care to control the clinical symptoms to allow resolution of the obstruction without further intervention [20]. While this method of treatment is often effective in treating the current obstruction, this approach does not address the adhesions that are the primary cause of the obstruction or the risk of subsequent bowel obstructions. The only treatment currently available to treat adhesive bowel obstructions is surgery; this frequently causes the formation of additional adhesions. It has been suggested in the literature that once a patient enters the cycle of adhesion formation each subsequent surgery exponentially enhances the formation of additional adhesions. The risk of surgically induced bowel perforation increases with the presence of adhesions, increasing surgical risk to the patient in addition to increasing surgical time and effort.

The number of surgeries for adhesion related disease in 2010 was a staggering 381,364 in the US with an additional 100,335 patients undergoing bowel resection and an average 30 day readmission rate of 11-15% [21]. Thus, adhesion related disease causes significant surgical efforts, hospital resources and comprise major expenditures each year. Additionally, there is a considerable negative impact on the patients' quality of life from frequent hospital readmissions. Beyond the surgical risk and management of patients during an SBO episode, these patients experience a negative impact on their quality of life (QOL). The most commonly impacted area of life in these patients is diet, in which patients often follow a limited diet due to the risk of causing another bowel obstruction, leading often to serious health consequences from malnutrition.

A conservative therapy that decreases the risk of bowel obstruction in the absence of surgery is of significant importance to both patients and physicians. The approach to treating patients with recurrent adhesive SBOs discussed is a multifaceted approach in both treatment and outcome monitoring, with a focus on methods that are the least invasive possible.

The Clear Passage Approach

The Clear Passage Approach (CPA) is a manual physical therapy (mPT) protocol focused on the deformation of adhesions throughout the abdomen and pelvis. Historically mPT used to treat adults with a wide variety of adhesive conditions including burns, adhesive capsulitis, radiculopathy, pain, infertility and lessening of scars [22–31] and has shown promise in preventing adhesion formation in animal models [32,33]. The CPA hypothesized to deform the adhesions that cause SBO episodes, incorporating a variety of recognized manual soft tissue techniques, including myofascial release [34], osseous and visceral manipulation [35], craniosacral and other manual therapies, along with refinements and modifications of these techniques to treat patients in a patient-centered model [36]. Adhesion deformation is achieved by direct force applied in a site specific manner after identification of areas of tissue with decreased mobility. Tissue mobility is addressed in a systematic manner beginning with the most superficial structures followed by deeper structures and viscera. The amount and duration of force that is applied to cause these microfailures varies within the tolerance of each patient and according to the site of the body that is being treated. For example, the same technique applied to large muscle groups will use much greater force than that which is applied to more delicate areas, such as structures at the cranium, or abdominopelvic viscera.

The treatment is typically performed for four hours a day over five consecutive days with 20 hours being the standard treatment regimen for the CPA. Side effects from treatment are minimal and transient (often resolving before treatment hour 12, data not shown) as described in Table 1 with the most common being pain in the hip or back areas and abdominal tenderness. Given the treatment regimen and the level of manual pressures, these reported side effects are not unexpected and are mild when compared to the risks and side effects from surgical intervention.

Several case reports have been published describing the successful treatment and outcomes of patients with recurrent SBOs due to adhesions treated with the CPA. The first was a multiple case series published in the Journal of Clinical Medicine that included two adults with extensive abdominal and pelvic surgeries experiencing recurrent SBOs due to adhesions that were treated with the CPA with a focus on deformation of pelvic and abdominal adhesions [37]. Both patients had resolution of SBO symptoms and improvement in general health at the time of publication of the study.

Table 1. Summary of reported side effects from CPA treatment over the course of treatment by SBO patients. Reported side effects were assessed daily with conditions present before treatment subtracted to assess the rate of new side effects. n = 31.

Side Effect	Rate of Observation
Abdominal tenderness	19.4%
Fatigue	9.7%
Headache	12.9%
Pelvic or abdominal cramping	9.7%
Poor sleep	3.2%
Aching	32.3%
Bloating	3.2%
Nausea	12.9%
Diarrhea	12.9%
Emotional lability or irritability	9.7%
Vaginal spotting	5.0%
Skin tear	6.5%
Tailbone pain	9.7%
Hip or back pain	22.6%

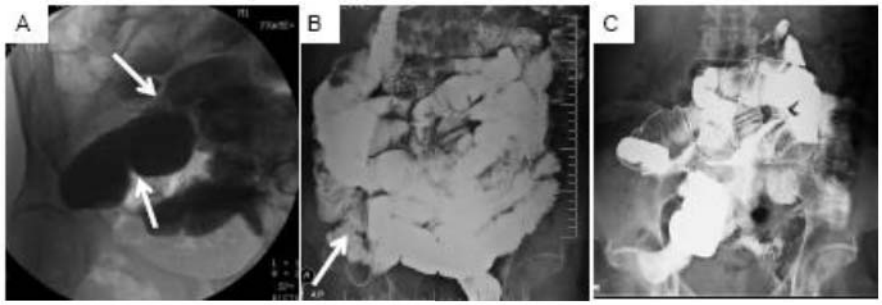

Figure 1. Small bowel radiographs of Patient 1 documenting SBO resolution over time. Arrows note areas of obstruction. (A) Before therapy in 2011: incomplete SBO due to adhesions visualized by X-ray showing dilation of the proximal mid ileum. (B) Twelve months after therapy in 2012: mild stricture at the terminal ileum with no other small bowel abnormalities. (C) After 40 h of therapy: normal small bowel series X-ray in 2012. Reprinted from J. Clin. Med. 2013, 2, 1-12; under a Creative Commons Attribution 4.0 International license.

Additional follow up with the patients has demonstrated long term benefits from the CPA treatment, with neither patient experiencing additional SBO episodes for 3 years. Figure 1 shows the timeline of small bowel X-rays

throughout the course of treatment of the patient, demonstrating the resolution of adhesions and stricture that were present before CPA treatment.

A second case report, published in Pediatric Reports, described the treatment of a young child with extensive surgical history secondary to an open book pelvic fracture obtained in a motor vehicle accident. The accident trauma, 19 required surgeries, extended use of VAC dressing, and subsequent healing caused dense adhesion formation throughout his abdomen and pelvis. The adhesions caused pain, recurrent SBOs and one testicle to ascend into the pelvis. The child was treated using the CPA and reported decreased pain, absence of SBOs, an improved diet and the avoidance of another surgery as the ascending testicle returned to normal position.

The longevity of benefits from the CPA treatment has been assessed in multiple patient populations including patients with recurrent SBOs. In long term follow up with 31 patients (mean 19 months post treatment; range 11 months to 35 months post treatment) demonstrated positive outcomes that were maintained long term with lower than would be expected for long term readmissions of 30% (Table 2). The demonstration in this limited number of patients is encouraging and warrants further investigation as a treatment option for this patient population. The single surgery required post CPA treatment was for radiation enteritis, which CPA treatment is not theorized to treat based upon the disease process associated with those sections of bowel. Anecdotal information from this patient population suggests that 20 hours of treatment is adequate to eliminate or decrease the frequency SBO episodes, however, some patients may require additional treatment for complete resolution of symptoms. This is currently under investigation to determine predictors for patient populations that would benefit from additional treatment.

The preliminary data on the treatment of patients with recurrent SBO due to adhesions was encouraging and supported further investigation in prospective clinical trials. However, before any prospective trials could be undertaken a tool for measurement of outcomes specific to this patient population had to be developed. A validated questionnaire was developed at Clear Passage to specifically monitor changes and outcomes for treatments focused on patients with adhesive SBO. This SBO questionnaire (SBO-Q) assess the impact on the QOL of SBO patients across six domains including diet, gastrointestinal symptoms, pain, pain severity, overall quality of life and the requirement for medication [38]. In the validation study patients with a history of SBO reported negatively impacts in all measured domains as compared to a population of patients with no history of SBO or abdominal surgery.

Table 2. Rates of SBO and surgical intervention of patients after CPA treatment as compared to rates expected based upon the literature at a mean time of follow up of 19 months. P-values from odds ratio calculation using standard methods n = 31.

	CPA treated rate	Expected rate	P-value
Hospital admissions for SBO post treatment	7	9.3	0.5264
Surgery post treatment	1	9.3	0.0215

Therefore, improvements in quality of life and the return to a level comparable to patients with a low risk of adhesions is significant, particularly to the personal experiences and improvements to the individual patient's QOL.

Prospective clinical studies utilizing the SBO-Q for outcome measurements are currently underway for determining the efficacy of the CPA in treatment of adhesive SBO.

Conclusion

Observational care and bowel rest are preferred in non-emergency cases of SBO, supporting the desire to use the least invasive method to treat each subject. Therefore, a noninvasive technique to treat symptoms related to SBOs has precedent. The use of the CPA, a manual physical therapy protocol, to treat abdominal and pelvic adhesions causing SBOs and improve the QOL of patients has been shown to have positive long term effects on SBOs with no evidence of induction of adhesion formation that is observed with subsequent surgery [30]. The results from the case reports and long term follow up suggest that the CPA can be used to treat adhesions and scar adherence safely in the recurrent SBO subject population.

The CPA is effective at adhesion deformation measured by symptom resolution in both adult and pediatric populations. It has been noted in published studies, however, that pediatric patients are expected to require additional treatment with growth and physical development due to the impact on scar tissue present, as is documented in the literature in children with large dermatological grafts.

Large prospective studies will offer more power in determining efficacy rates and populations that benefit from the CPA treatment, providing guidance in surgical alternative for patients with adhesion related bowel obstructions.

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