The Downtown Review

Volume 8 | Issue 2 Article 1

May 2022

In a Bind: Effect of Abdominal Binding on Postoperative Pain in Abdominal Surgery Patients

Mattison Edinger-VanAtta
Cleveland State University School of Nursing

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Cover Page Footnote

I would like to thank Dr. Mary Gergis (Cleveland State University School of Nursing) for her guidance and support throughout the completion of this project. I also thank the student reviewers of The Downtown Review for taking time to participate in and protect the all-important process of peer review.

In a medical field increasingly focused on treatment over prevention, surgical technologies have become more advanced and more prevalent than ever before. As a result, surgical procedures have become one of the most common reasons that patients are admitted to the hospital. The chief concern of the patient in these cases is often pain management after surgery. Poorly managed pain decreases patient satisfaction, increases anxiety, impairs rest during the healing process, and most importantly, can make the patient reluctant to participate in postoperative exercises essential to avoiding complications. Due to the increased risk for complications associated with pain, unmanaged postoperative pain can also lead to longer hospital stays, heavier financial burdens, and higher rates of mortality. Clearly, pain management is high on the priority list of postoperative outcomes for both patients and healthcare team members alike, so it is no surprise that we have seen such great innovation in this area in the past several decades. From pharmacological interventions to distraction techniques, methods of pain management are vastly diverse. One such intervention recently brought into use is the abdominal binder, often made of an elastic, Velcro-fastened band secured around the patient's abdomen to splint and compress the peri-incisional area. The use of this intervention begs the question of what the research shows on the matter: in patients who have undergone abdominal surgery, what is the effect of abdominal binders on postoperative pain? The answer, sought in this paper, will tell us whether the use of these devices for pain management in abdominal surgery patients is an effective and evidence-based nursing practice.

In collecting literature on the topic, five peer-reviewed articles were selected from databases such as *PubMed* and the *Cumulative Index for Nursing and Allied Health Literature* (*CINAHL*). Under search terms "abdominal surgery AND abdominal binder AND pain," the search was narrowed to include only peer reviewed articles published in the last five years that were either systematic reviews or randomized controlled trials and answered the research question previously stated. From the following literature analysis, it became resoundingly clear that abdominal binders are indeed effective in attenuating the postoperative pain of abdominal surgery patients, at least in some capacity. This finding was the justification for the ultimate proposed intervention this project is centered around.

Literature Review

The following summarizes the findings of each of the five selected articles and identifies themes and patterns in the research as they pertain to the research question. These findings and patterns are what ultimately supports the implementation of the change in practice this project seeks to suggest.

Arici et al (2016) conducted a randomized controlled trial in which a sample size of 84 abdominal surgery patients were randomly assigned either to an intervention group or a control group. The intervention group wore an abdominal binder any time they were out of bed while in the hospital in addition to receiving

standard postoperative treatment, while the control group only received this standard treatment without the elastic binder (Arici et al., p. 110). The study assessed the patients on the first, fourth, and seventh postoperative days to evaluate the effect of abdominal binding on gastrointestinal function, mobilization, pulmonary function, and acute pain (Arici et al., p. 108). Baseline measures were taken on all of these factors one day before surgery to have a basis for comparison to the postoperative outcomes. Pain status was evaluated after mobilization once the patient was seated in bed using the short-form McGill Pain Questionnaire and the visual analogue scale (Arici et al., p. 111). Overall, the McGill pain scores were higher in the control group than the intervention group on the first, fourth, and seventh postoperative day, and the pain difference in total pain scores, as well as the difference in visual analogue scores, was found to be statistically significant for all three testing days (Arici et al., pp. 114-115). Thus, this trial shows that use of an abdominal binder decreases postoperative pain in abdominal surgery patients throughout the postoperative period.

Chantawong and Charoenkwan (2021) conducted a randomized controlled trial that sought to determine the effect of elastic abdominal binders on pain and functional recovery in patients undergoing gynecological cancer surgery. This article was selected for inclusion in this review because an inclusion criterion for the trial was that the cervical, endometrial, or ovarian cancer was treated specifically via open abdominal surgery (Chantawong & Charoenkwan, p. 1). In the study, 109 patients were randomly assigned either to the intervention group, which had 56 patients that wore the elastic binder at all times during the hospitalization from the first postoperative day, or the control group, which had 53 patients that did not wear the binder. A subgroup in each of these experimental groups was also created for patients age 50 and older (Chantawong & Charoenkwan, pp. 1-2). Like the test subjects in Arici et al. (2016), standard postoperative care was provided to both groups (Chantawong & Charoenkwan, pp. 2-3). Pain was evaluated using the visual analogue scale pain score twice a day at 1000 and 1800, and these scores were averaged to represent the pain score for that day (Chantawong & Charoenkwan, p. 3). In the regular experimental groups, there were significantly higher pain scores in the control group than in the intervention group on the first and second postoperative day (Chantawong & Charoenkwan, Table 2). The intervention group had lower pain scores on the third day as well, but this was not a statistically significant difference (Chantawong & Charoenkwan, Table 2). In the 50 and over subgroup, however, the control group had significantly higher pain scores on all three days (Chantawong & Charoenkwan, Table 2). Thus, Chantawong and Charoenkwan, unlike Arici et al., concluded that abdominal binders only conclusively had the effect of decreasing postoperative pain in the 50 and over age group. The effect for the general population was inconclusive (Chantawong & Charoenkwan, p. 9).

Ghana et al.'s (2017) randomized controlled trial included 178 patients

undergoing non-emergency cesarean deliveries and studied the effect of abdominal binding on pain, distress, and hemoglobin and hematocrit levels. All patients received routine care before, during, and after delivery, and the participants were randomly assigned to two groups of 89 patients each to create the intervention and control groups (Ghana et al., pp. 272-273). In addition to routine care, the intervention group began wearing an elastic abdominal binder two hours after delivery and continued wearing it for two days after delivery, only removing it from 2200 to 0800 overnight (Ghana et al., p. 272). Like Arici et al. (2016) and Chantawong and Charoenkwan (2021), Ghana et al. also used the visual analogue scale to evaluate acute pain in both groups, and pain was measured directly after delivery before the binder was applied, every 6 hours thereafter for 48 hours, and 15 minutes before administration of standard analgesics (p. 272). Both groups had roughly the same pain scores directly after delivery, but as time went on and the binders were applied to the intervention group, this group showed significantly lower pain scores than the control group each time pain was assessed (Ghana et al., p. 273). Like Arici et al., Ghana et al. found that abdominal binders had the effect of decreasing postoperative pain in abdominal surgery patients, specifically those undergoing cesarean delivery (p. 275).

Ossola et al. (2021) performed a systematic review of randomized controlled trials to determine the effect of postoperative abdominal binding on pain, pulmonary function, physical activity, and comfort in patients undergoing midline laparotomy, a major abdominal surgical approach. Articles for inclusion in the study were selected from *PubMed*, *EMBASE*, and *CENTRAL* and included a "binder" and "non-binder" group of patients treated up to March 2020 (Ossola et al., p. 244). A total of 281 patients were included from all selected articles and data was available for postoperative pain on the first, third, and fifth postoperative day (Ossola et al., pp. 246-247). All studies used the visual analogue scale to assess pain (Ossola et al., p. 246). The review found that pain was lower in the "binder" group on day 1 and day 5 with no statistically significant difference in pain scores between the groups on day 3 (Ossola et al., p. 247). This systematic review concluded that abdominal binders are effective in reducing postoperative pain following midline laparotomy, but should be used as an adjunct intervention to pharmacological analgesia (Ossola et al., 2021, p. 249).

Sun et al. (2021) also conducted a systematic review on the effect of abdominal binders on postoperative pain and functional recovery in patients undergoing abdominal surgery. *PubMed*, *Embase*, *Cochrane Library*, and *PEDro* databases were included in the review and articles published up to November 30, 2019 were selected if they included a group wearing a binder and a group not wearing a binder, much like the aforementioned trials and review (Sun et al., p. 1). A total of 1,317 patients over 14 studies were included (Sun et al., p. 1). Once again, the visual analogue scale was used to assess pain in all studies, and this was even an inclusion factor for this systematic review (Sun et al., p. 4). The review found

heterogeneity between the selected trials, and upon subgroup analysis, noted that there were significant differences in pain improvement on postoperative day 1 with patients who had undergone cesarean delivery and those undergoing other types of abdominal surgery (Sun et al., pp. 5-6). Because of this heterogeneity, the results were inconclusive regarding the effect of abdominal binding on postoperative pain on the first postoperative day. However, some of the selected trials also presented data for postoperative day 2, 3, 4, and 7, and pain scores were significantly lower in the intervention groups on all of these days (Sun et al., pp. 6-7). Sun et al. concluded that abdominal binders do decrease postoperative pain in patients undergoing abdominal surgery, especially on the fourth postoperative day and later (p. 9).

All of the studies selected for this project assessed the effect of abdominal binding on postoperative pain following various types of abdominal surgery. Each of them randomly assigned patients to a "binder" or "non-binder" group and used the visual analogue scale to assess postoperative pain throughout the hospital stay. All of these studies concluded that elastic abdominal binders can attenuate postoperative pain in some capacity when worn during the postoperative period following abdominal surgery. There was some dissension to this finding, such as from Chantawong & Charoenkwan (2021), who only found this to be true in their 50 and over subgroup, and from Sun et al. (2021) who found most of the benefit to occur on or after the fourth postoperative day. However, the overwhelming result of this review is that abdominal binders do in fact improve postoperative pain in patients undergoing open abdominal surgery of any kind. It is this finding that guides the following proposed intervention.

Proposed Intervention

Based on the findings of the above literature review, this project seeks to propose that abdominal binding be implemented in the postoperative care of all patients undergoing open abdominal surgery, unless contraindicated. At present, this intervention has certainly become more common, but its implementation is often patient- and facility-dependent. The overwhelming consensus from the above research is that abdominal binders can and should be adopted more universally to improve the chances of more successful pain management initiatives in the postoperative setting and, subsequently, decrease complications.

The planning of this change in practice begins with healthcare researchers, who will need to look for potential contraindications to abdominal binding to ensure this change is introduced safely. From there, planning will fall into the hands of nursing unit managers, who will be responsible for ensuring that their floors are stocked with abdominal binders in multiple sizes to accommodate each patient. Binders of varying materials should also be sourced to accommodate patients with textile allergies or sensitive skin. Implementation must be spearheaded by physicians, specifically the surgeons performing surgery on the patients included in

this practice change. A written order from the physician regarding the appropriate size of the binder and the frequency and duration of binding will allow nursing staff to implement this intervention according to the patient's specific needs and physician orders. Unlicensed personnel and other patient care team members, such as physical and occupational therapists, will be responsible for monitoring the patient's condition while using the binder and reporting misuse and other abnormalities to the nurse. In addition to implementation, staff nurses will largely spearhead the evaluation of this intervention because they are often the ones assessing the patient's postoperative pain on the most regular basis. Findings from this evaluation will be reported back to physicians, who can use this information to further contribute to knowledge acquisition regarding the exact specifications that make binding most effective for each patient situation depending on the type of surgery and other factors.

Like with any change in practice, it is important to consider the barriers to implementing this proposal. For example, patients may be apprehensive of abdominal binders as it may seem counterintuitive to use such a constricting device for pain relief. Additionally, because there is little existing research about contraindications to the use of abdominal binding, a patient safety risk is posed by the risk of complications or adverse reactions that we are unaware of at this time. Another barrier is that abdominal binders pose the risk for skin breakdown if they are applied incorrectly, such as being wrapped too tightly or too loosely, or are not kept clean and dry. The solution to surmounting each of these potential setbacks is education: if physicians, nurses, unlicensed assistive personnel, and others in frequent contact with the patient are thoroughly educated on the benefits and effective use of the binder and are able to impart this knowledge to their patients, the implementation of this change is expected to go smoothly. Caregivers can overcome these barriers by teaching the patient about how the binder attenuates pain, what changes in condition are indicative of a possible complication or adverse reaction and how to respond, and how to bind safely and correctly.

Another barrier to implementing abdominal binding more universally is the cost that the purchase of these devices en masse would pose to healthcare facilities. At present, there are other, cheaper alternatives to binders that are already used routinely in the care of abdominal surgery patients. These include holding a pillow against the abdomen to splint the incision when performing postoperative activities such as coughing and deep breathing exercises or ambulation. In fact, it was this nursing intervention that inspired the use of abdominal binders in the first place, as both work by decreasing tension on the incision and subsequently preventing and alleviating pain. Despite the cost, it is important that healthcare budgeting committees prioritize abdominal binders over their cheaper or, in the pillow example, free alternatives. Abdominal binders were born from the need to improve on the splinting pillow, which can increase a patient's risk for falls by eliminating the use of one hand for steadying and detracting attention away from the activity at

hand, and do not provide a solution for semi-permanent incisional splinting in the way that abdominal binders do as a wearable device. This financial barrier to implementing the proposed intervention can be overcome by acknowledging the abdominal binder for its evidence-based advantages over cheaper alternatives and prioritizing its purchase in hospital budgets accordingly.

Conclusion

As evidenced by this project, current literature suggests that the abdominal binder is an effective measure, in tandem with traditional postoperative interventions, to decrease postoperative pain in patients undergoing a variety of different open abdominal surgeries. As a result, it is the suggestion of this project that this intervention be universalized in the postoperative care of abdominal surgery patients in order to bolster the pain management response and subsequently improve patient satisfaction, reduce anxiety, improve rest during recovery, and increase compliance with essential postoperative activities as a means of decreasing complications. The effects of pain on a patient's time in the hospital are vast and can mean the difference between a speedy recovery and a prolonged course treating potentially fatal complications, so it is imperative that the healthcare community pursue evidence-based practices such as abdominal binding to keep this immense barrier to recovery at bay.

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