

Colonoscopy using Back Brace Support Belt: A Randomized, Prospective Trial

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ABSTRACT

Colonoscopy is a crucial procedure for early detection and prevention of colorectal diseases, but it often presents challenges such as patient discomfort and extended procedural times. This study examines the effectiveness of abdominal belts in enhancing colonoscopy procedures. A prospective randomized controlled trial was conducted with 54 adult patients, divided into an intervention group using abdominal belts and a control group without. The abdominal belts provided additional support and stabilization during the procedure. Key outcomes, including procedural duration, patient discomfort and quality of colon visualization, were analyzed. Results indicate that the use of abdominal belts significantly reduced procedural time and improved overall patient experience. These findings suggest that incorporating abdominal belts into standard colonoscopy practice could enhance efficiency and patient comfort.

Categories: Other; Gastroenterology; Therapeutics

Keywords: Abdominal compression; Colonoscopy utilization; Colonoscopy adherence rate; Colonoscopy duration; Screening colonoscopy

Introduction

Colonoscopy, a critical procedure for the early detection and prevention of colorectal disease, often presents challenges both for patients and medical professionals. These challenges can lead to discomfort, increased procedural time and variable success rates in comprehensive colon visualization. Recent advancement in medical technology have introduced the use of abdominal belt as a tool to mitigate these issues¹⁻⁴.

This article explores the effectiveness of abdominal belts in improving the ease and efficiency of colonoscopy procedures⁵⁻⁷. By providing additional support and stabilization, these belts have the potential to shorten procedure durations and enhance overall patient experience⁸⁻¹¹. This introduction sets the stage for a detailed analysis of current research findings, practical applications and potential benefits of incorporating abdominal belts into standard colonoscopy practices.

Materials and Methods

Study Design: This randomized trial was designed to evaluate the effectiveness of abdominal belts in improving colonoscopy procedures.

Participants: The study included 54 adult patients scheduled for routine colonoscopy. The patients were selected from the Fundeni Clinical Institute, Bucharest, Internal Medicine Ward between 01 Apr 2024 and 01 Nov 2024. Inclusion criteria included patients with age over 18, while exclusion criteria rejected patients with previous abdominal surgery or contraindications for colonoscopy or patients with incomplete colonoscopy visualisation. Informed consent was obtained from all participants and the study was approved by the local ethics committee no 66357/16Dec2024 and reported to clinicaltrials.org with the Organization’s Unique Protocol ID ICFGS01.

Intervention: Participants were randomly assigned to either the intervention group, which used an abdominal belt or the control group, which did not. The abdominal belt was applied immediately before the procedure commenced. The abdominal belt provided support and stabilization during the procedure (Figure 1).



Figure 1: Abdominal Black Brace Belt.

Procedure: Colonoscopy procedures were performed by experienced gastroenterologists following a standard protocol.

Data Collection: Data were collected on procedural duration, patient discomfort and the time necessary to intubate the cecum.

Statistical Analysis: Data were analyzed using JASP 0.16 software. Descriptive statistic was used to summarize the data and t-tests were employed to compare the 2 groups. A p-value of less than 0.05 was considered statistically significant.

Results

The group is composed of 54 patients (22 females and 32 males) with a medium age of 58.318 years (females) and 57.688 years (males), a medium height of 162.273 cm (females) and 173.156 cm (males), a medium weight of 70.864 kg (females) and 85.219 kg (males) was included in this analysis (Table 1).

Out of all the 54 patients that were investigated, 28 patients wore the belt during colonoscopy, while 26 patients did not wear the belt during colonoscopy. The medium duration of colonoscopy was 305.750 seconds in the group of patients that wore the belt, respectively 593.269 seconds in the group of patients that did not wear the belt (Table 2).

Table 1: Descriptive statistics.

	Age (years)		Height (cm)		Weight (Kg)		BMI	
	Female	Male	Female	Male	Female	Male	Female	Male
Valid	22	32	22	32	22	32	22	32
Missing	0	0	0	0	0	0	0	0
Median	56.00	59.00	163.50	171.00	68.50	83.00	26.07	27.76
Mean	58.32	57.69	162.27	173.16	70.86	85.22	26.92	28.35
Std. Error of Mean	2.83	2.63	1.50	1.44	3.78	3.55	1.39	1.00
Std. Deviation	13.26	14.85	7.02	8.17	17.75	20.09	6.51	5.68
Minimum	31.00	24.00	150.00	158.00	45.00	58.00	16.14	20.34
Maximum	83.00	80.00	180.00	190.00	118.00	170.00	44.41	47.09

Table 2: The duration of colonoscopy (seconds) in the belt arm compared with the group without belt.

Descriptive Statistics		
	Duration (sec)	
	belt	nobelt
Mean	305.75	593.27
Std. Deviation	204.75	443.94
Minimum	108.00	141.00
Maximum	1260.00	1980.00

The group of 28 patients that wore the belt had a medium age of 62.286 years, while the group of 26 patients that wore no belt had a medium age of 53.269 years (Table 3).

Table 3: The age of the patients in both groups.

Descriptive Statistics		
	Age (years)	
	belt	nobelt
Mean	62.29	53.27
Std. Deviation	11.04	15.68
Minimum	30.00	24.00
Maximum	80.00	83.00

Patients whose colonoscopy was performed until the cecum had a medium age of 58.00 years, while patients whose colonoscopy was performed until the terminal ileum had a medium age of 57.625 years (Table 4).

Table 4: The age of patients and the terminal point of colonoscopy.

		Age (years)	
		cecum	terminal ileum
	0	0	
Mean		58.00	57.63
Std. Deviation		14.08	15.17
Minimum		24.00	31.00
Maximum	83.00	80.00	

A Boston Bowel Preparation Score (BBPS) of 4 was observed in patients with a medium age of 58.00 years and a BBPS of 5 was observed in patients with a medium age of 59.00 years.

Moreover, a BBPS of 6 was seen in patients with a medium age of 55.077 years, while a BBPS of 7 was noticed in patients with a medium age of 63.133 years. Finally, a BBPS of 8 was registered in patients with a medium age of 61.889 years and a BBPS of 9 was described for patients with a medium age of 48.778 years (Table 5).

Table 5: The BBPS distribution according to age.

	Age (years)					
	4	5	6	7	8	9
Valid	2	6	13	15	9	9
Mean	58.00	59.00	55.08	63.13	61.89	48.78
Std. Deviation	2.83	17.11	14.03	12.65	12.20	15.23
Minimum	56.00	28.00	30.00	34.00	44.00	24.00
Maximum	60.00	74.00	73.00	83.00	80.00	72.00

The medium duration of a colonoscopy for the 22 females that took part in this analysis was 490.864 seconds, while the medium duration of a colonoscopy for the 32 males that participated in this analysis was 412.094 seconds (Table 6).

Table 6: Duration and Sex.

	Duration (sec)	
	Female	Male
Valid	22	32
Mean	490.86	412.09
Std. Deviation	459.40	292.95
Minimum	126.00	108.00
Maximum	1980.00	1320.00

The 32 males that underwent colonoscopy had a medium BBPS of 6.938. On the other hand, the 22 females that underwent colonoscopy had a medium BBPS of 6.909 (Table 7).

Table 7: The BBPS split by sex.

	BBPS	
	Female	Male
Valid	22	32
Mean	6.91	6.94
Std. Deviation	1.34	1.41
Minimum	4.00	4.00
Maximum	9.00	9.00

The 28 patients that wore the belt during colonoscopy had a medium height of 167.429 cm and a medium weight of 82.857 kg. The 26 patients that wore no belt during colonoscopy had a medium height of 170.115 cm and a medium weight of 75.615 kg (Table 8).

Table 8: The Height and weight of the patients with or without belt.

	Height (cm)		Weight (Kg)		BMI	
	belt	nobelt	belt	nobelt	belt	nobelt
Valid	28	26	28	26	28	26
Mean	167.43	170.12	82.86	75.62	29.63	25.77
Std. Deviation	8.69	10.02	14.75	24.69	5.34	6.15
Minimum	154.00	150.00	60.00	45.00	21.80	16.14
Maximum	190.00	190.00	118.00	170.00	44.41	47.09

The 8 patients who underwent colonoscopy with general anesthesia had a medium height of 171.375 cm and a medium weight of 77.750 kg. The other 46 patients who underwent colonoscopy without general anesthesia had a medium height of 168.261 cm and a medium weight of 79.652 kg (Table 9).

Table 9: The analysis of the patients with or without general anesthesia.

	Height (cm)		Weight (Kg)		BMI		Duration (sec)	
	No	Yes	No	Yes	No	Yes	No	Yes
Valid	46	8	46	8	46	8	46	8
Mean	168.26	171.38	79.65	77.75	27.96	26.67	425.26	553.00
Std. Deviation	9.58	8.05	20.94	17.17	5.90	6.98	362.19	406.87
Minimum	150.00	160.00	50.00	45.00	18.59	16.14	108.00	210.00
Maximum	190.00	186.00	170.00	100.00	47.09	39.06	1980.00	1320.00

The 32 colonoscopies performed with CO₂ insufflation had a medium duration of 367.875 seconds, while the other 22 colonoscopies performed with no CO₂ insufflation had a medium duration of 555.182 seconds (Table 10).

Table 10: The relation between CO₂ insufflation and duration.

	BMI		Duration (sec)	
	No	Yes	No	Yes
Valid	22	32	22	32
Mean	26.95	28.34	555.18	367.88
Std. Deviation	5.11	6.59	415.96	315.33
Minimum	16.14	18.59	210.00	108.00
Maximum	39.06	47.09	1980.00	1620.00

The 8 colonoscopies performed with general anesthesia had a medium duration of 553.00 seconds. The remaining 46 colonoscopies performed without general anesthesia had a medium duration of 425.261 seconds (Table 11).

Table 11: General anesthesia and duration.

	Duration (sec)	
	No	Yes
Valid	46	8
Mean	425.26	553.00
Std. Deviation	362.19	406.87
Minimum	108.00	210.00
Maximum	1980.00	1320.00

The 44 colonoscopies performed using a Pentax Imagina endoscope had a medium duration of 419.932 seconds. The 10 colonoscopies performed using a Pentax Defina endoscope had a medium duration of 550.900 seconds (Table 12).

Table 12: Type of endoscope and duration.

	Duration (sec)	
	Pentax Defina	Pentax Imagina
Valid	10	44
Mean	550.90	419.93
Std. Deviation	355.72	370.25
Minimum	210.00	108.00
Maximum	1320.00	1980.00

A BBPS of 4 was observed in patients with a medium weight of 85.00 kg, while a BBPS of 5 was encountered in patients with a medium weight of 71.50 kg. A BBPS of 6 was calculated in

patients with a medium weight of 90.923 kg. A BBPS of 7 was met in patients with a medium weight of 75.60 kg. A BBPS of 8 was noticed in patients with a medium weight of 74.444 kg. A BBPS of 9 was obtained in patients with a medium weight of 77.889 kg (**Table 13**).

Table 13: BBPS and weight.

	Weight (Kg)					
	4	5	6	7	8	9
Valid	2	6	13	15	9	9
Mean	85.00	71.50	90.92	75.60	74.44	77.89
Std. Deviation	21.21	23.17	28.11	13.93	13.33	17.48
Minimum	70.00	58.00	45.00	50.00	59.00	54.00
Maximum	100.00	118.00	170.00	100.00	100.00	100.00

Colonoscopies had a medium duration of 365.00 seconds in patients with a BBPS of 4. A medium duration of 351.833 seconds was observed in patients with a BBPS of 5, while a medium duration of 333.769 seconds was calculated in patients with a BBPS of 6. Procedures had a medium duration of 498.800 seconds in patients with a BBPS of 7. A medium duration of 528.333 seconds was obtained in patients with a BBPS of 8, while a medium duration of 507.667 seconds was secured in patients with a BBPS of 9 (**Table 14**).

Table 14: BBPS and duration.

	Duration (sec)					
	4	5	6	7	8	9
Valid	2	6	13	15	9	9
Mean	365.00	351.83	333.77	498.80	528.33	507.67
Std. Deviation	49.50	96.83	294.17	419.77	563.89	297.49
Minimum	330.00	251.00	126.00	108.00	150.00	201.00
Maximum	400.00	480.00	1260.00	1620.00	1980.00	1020.00

The median duration of colonoscopy was 305.750 seconds in the group of patients that wore the belt, compared to 593.269 seconds in the group of patients that did not wear the belt. The main objective of this trial was to evaluate the relationship between the duration of the colonoscopy (the time interval needed to intubate the cecum) and the wearing of an abdominal belt by the patient (**Figure 2**). The data obtained showed that the duration for the belt-wearing group was less than the duration for the no-belt group (**Tables 1 and 15**).

Table 15: Independent T- student for colonoscopy duration.

Indepen						
	t	df	p		Mean Difference	SE Difference
Duration (sec)	-3.09	52	1.59×10 ⁻³	^a	-287.52	92.97

dent Samples T-Test

Note. For all tests, the alternative hypothesis specifies that group belt is less than group nobelt .

Note. Student's t-test.

^a Levene's test is significant (p < .05), suggesting a violation of the equal variance assumption

Discussion

The data obtained was analyzed and we observed that the group had a similar age distribution. The females had slightly lower weight, height and BMI compared to the males, as expected. The group that used the belt had a higher BMI. The patients in the belt group had a median age 10 years older and the bowel preparation score was not influenced by age or sex but

was better in thinner patients. The use of CO₂ insufflation had a negative effect on the overall duration of the colonoscopy and the use of general anesthesia prolonged the duration. The type of endoscope used had a minor influence on the duration. The BBPS influenced the duration of colonoscopy, with shorter times observed in better-prepared patients with higher BBPS scores.

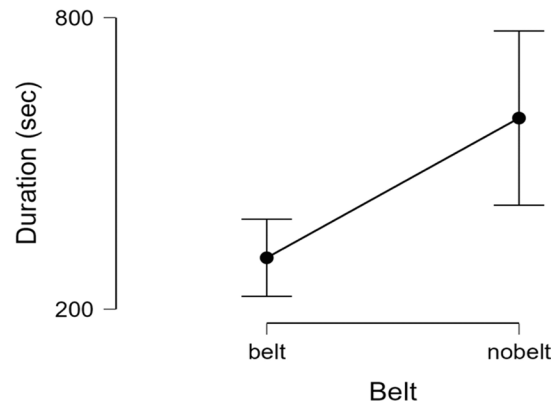


Figure 2: Graphic of the duration of cecum intubation.

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A p-value of 0.00159 confirms that the correlation between the use of the belt and the duration of the procedure is correct and strong. This confirms that the use of a belt in colonoscopy can increase the cecum intubation rate and improve patient comfort.

Several limitations are present in our study. First, colonoscopies were performed by only one experienced endoscopist, making it difficult for other endoscopists to replicate similar results. Second, more males (32) participated in this study compared to females (22), which could suggest gender bias in the results. A third limitation is that most of the examined patients had a short stature (median height of 168.722 cm), indicating an imbalance in terms of height in the examined group. Another limitation is that the examined group had a median weight of 79.370 kg, making it difficult to generalize the results to patients with different median weights. Finally, there was also an age disparity, as the examined group of patients had a median age of 57.944 years.

Conclusions

In conclusion, it was demonstrated that an abdominal belt shortened the required time for performing a complete colonoscopy. Also, the thinner and better prepared patients are easier to receive a fast colonoscopy procedure. The use of the abdominal belt made the procedure easier to perform for the endoscopist and also made it easier to endure for the patient. Such an abdominal belt could be implemented in the daily activities of every endoscopy unit.

Additional Information

Disclosures

Human subjects: Consent for treatment and open access

publication was obtained or waived by all participants in this study. Fundeni Clinical Institute, Ethical Committee issued approval 41267. The Ethical Committee approved the publication.

Animal subjects: All authors have confirmed that this study did not involve animal subjects or tissue.

Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following:

Payment/services info: All authors have declared that no financial support was received from any organization for the submitted work.

Financial relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work.

Other relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

References

- Zafar Y, Rashid AM, Javaid SS, et al. Use of abdominal compression device in colonoscopy: a systematic review and meta-analysis. *Clin Endosc* 2023;56:446-452.
- Liu T, Meng Y, Xiong F, et al. Impact of an Abdominal Compression Bandage on the Completion of Colonoscopy for Obese Adults: A Prospective Randomized Controlled Trial. *Canadian J Gastroenterology and Hepatology*.
- Goksoy B, Kiyak M. The effectiveness of using an abdominal binder during colonoscopy: a randomized, double-blind, sham-controlled trial. *Scand J Gastroenterol* 2021;56:990-997.
- Yu GQ, Huang XM, Li HY, et al. Use of an abdominal obstetric binder in colonoscopy: A randomized, prospective trial. *J Gastroenterol Hepatol* 2018;33:1365-1369.
- Allison R. Schulman, MD, MPH, Marvin Ryou, MD and Walter W. Chan, MD, MPH. A Novel Hands-Free Abdominal Compression Device for Colonoscopy Significantly Decreases Cecal Intubation Time. *J Laparoendoscopic* 2017.
- Toros AB, Ersoz F and Ozcan O. Does A fit Abdominal Corset Makes Colonoscopy More Tolerable? *Digestive Endoscopy* 2012;24:164-167.
- Tsutsumi S, Fukushima H, Kuwano H. Colonoscopy using an abdominal bandage. *Hepatogastroenterology* 2007;54:1983-1984.
- Toyoshima O, Nishizawa T, Sakitani K, Yamakawa T, Yoshida S, Fukagawa K, Hata K, Ishihara S and Suzuki H. Colonoscopy using back brace support belt: A randomized, prospective trial. *JGH Open* 2020; 4:441-445.
- Mahros AM, Shenawy EME, Ahmed MH. Value of abdominal pressure by using abdominal belt in facilitating colonoscopy procedure in Egyptian patients. *J Pakistan Medical Association* 2023;73:263-266.
- Crockett Seth D, Cirri HO, Kelapure R, et al. Use of an Abdominal Compression Device in Colonoscopy: A Randomized, Sham-Controlled Trial. *Clin Gastro and Hepatol* 2016;14:850-857.
- Toyoshima O, Nishizawa T, Sakitani K. Colonoscopy using back brace support belt: A randomized, prospective trial. *JGH Open* 2019;4(3):441-445.