Evidence on postoperative abdominal binding: A systematic review with meta-analysis of randomized controlled trials

Paolo Ossola [a,*], *Federico Mascioli* [a], *Diego Coletta* [b], *Margherita Pizzato* [c], *Marco Bononi* [a]

[a] *Pietro Valdoni, Department of Surgery, Sapienza University of Rome, Rome, Italy*
[b] *Department of Surgery, Emergency Department – Division of Emergency and Trauma Surgery, Sapienza University of Rome, Rome, Italy*
[c] *Department of Clinical Sciences and Community Health, Università degli Studi di Milano, Milan, Italy*

ARTICLE INFO

Article history:
Received 20 May 2020
Received in revised form
1 July 2020
Accepted 13 July 2020
Available online xxx

Keywords:
Laparotomy
Abdominal binder
Postoperative pain

ABSTRACT

Background: Midline laparotomy is an unavoidable approach to many surgical procedures. Many surgeons prescript the use of postoperative abdominal binder during the first mobilization after surgery. The use and the cost effective of this device is still debated by many surgeons.

Methods: PubMed, EMBASE and the CENTRAL were systematically searched for randomized controlled trials (RCT) comparing patients who wore abdominal binder ("binder") and patient who did not wear any abdominal binder ("non-binder") up to March 2020. The primary outcomes measured in the comparison were postoperative pain, pulmonary functions, the entity of physical activity, the comfort. A meta-analysis of relevant studies was performed using RevMan 5.3.

Results: wearing an abdominal binder after midline laparotomy seems to reduce postoperative pain on first and third postoperative day, to improve the physical activity on third postoperative day, and not affect pulmonary functions. Generally, an elastic abdominal binder is well tolerated during postoperative.

Conclusions: the use of elastic abdominal binder permits a comfortable early postoperative mobilization reducing pain, increases physical activity and seems to not affect pulmonary functions.

Introduction

In the era of minimally invasive surgery, midline laparotomy remains an unavoidable approach to many surgical procedures, also in elective settings. It is well known that laparotomic procedures are burdened with higher postoperative pain, discomfort, and morbidity rate than minimally invasive approaches.

In order to relieve postoperative pain during mobilization, deep breath or cough, many surgeons prescribe an abdominal binder. This device is a wide belt, applied on the abdomen, with the purpose of generate a constant pressure and support the incision. The pressure on the midline incision should reduce the tissue edema and should decrease wound dehiscence rate.[1]

Actually, there is neither a specific protocol to use this device nor absolute evidences are reported. The prescription of postoperative binder remains an heritage transmitted by surgery schools in order to prevent early abdominal wall complications: in West countries elastic binder are preferred, in Asia, instead, non-elastic ones are more common for the belief of a better incisional support. No evidence supporting these theories are now available.[1]

* *Corresponding author*. Pietro Valdoni Department of Surgery, Sapienza University of Rome, Policlinico Umberto I°, Viale del Policlinico, 151, 00161 Rome, Italy.
E-mail address: paolo.ossola@uniroma1.it (P. Ossola).
https://doi.org/10.1016/j.surge.2020.07.003
1479-666X/

Please cite this article as: Ossola P et al., Evidence on postoperative abdominal binding: A systematic review with meta-analysis of randomized controlled trials, The Surgeon, https://doi.org/10.1016/j.surge.2020.07.003

Given the contradictory literature we performed a meta-analysis of randomized controlled trials (RCTs) with the aim of evaluate the results of dressing the abdominal binder after midline laparotomy in elective settings.

Materials and methods

PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses)[2] guidelines were followed in order to identify RCTs comparing patient wearing abdominal binder ("binder") versus patient who did not wear any abdominal binder ("non-binder") in postoperative period. A search protocol was developed before data collection. The Literature was reviewed up to March 2020. The PubMed/MEDLINE, EMBASE and CENTRAL electronic databases[3] were utilized with a combination of the following search words: "abdominal binder" or "postoperative binder" or "abdominal girdle" or "postoperative abdominal girdle". All articles dealing with a comparison between the use or not of abdominal binder in the postoperative were considered eligible. Full-text papers considered for inclusion were appraised and the relative references were hand-

Fig. 1 – Risk of bias of included studies.

Please cite this article as: Ossola P et al., Evidence on postoperative abdominal binding: A systematic review with meta-analysis of randomized controlled trials, The Surgeon, https://doi.org/10.1016/j.surge.2020.07.003

searched to find additional, eligible works. Potentially includable studies were investigated and eventually included in the analysis if: were in the English language, were RCT with a comparison between binder versus non-binder was present; were adult patients underwent elective surgery via a midline laparotomy. Emergency interventions, laparoscopic/robotic procedures have been excluded. All disagreements concerning inclusion of studies were solved by consensus among all authors. According to the pre-established pattern the retrieved data were: study design, demographics characteristics such as age, body mass index (BMI), number of patients in each group, type of surgical procedure, randomization and blinding, indication for surgery, length of anesthesia, length of the incision, POstoperative Pain (POP) scores, 6 Minutes Walking Test (6MWT), Forced Expiratory Volume measuring during the first second (FEV_1), Forced Vital Capacity (FVC), patient comfort wearing the binder, Length Of Stay (LOS). The POP, FEV_1, FVC, and comfort were considered as main outcomes measures.

POP has been quantified with the visual analogue scale (VAS) in all studies,[4–8] associated or not with the main amount of pain medication used.

The degree of comfort is calculated with a scale ideated by Fagevik et al.[7]: the level of comfort ranged between "uncomfortable", "slightly comfortable", "satisfactory", "comfortable", and "very comfortable". For each item Fagevik et al.[7] assigned a score varying from 0 for "uncomfortable", to 5 for "very comfortable"; in Arici et al.[4] series, the score ranged from 1 for "uncomfortable", to 4 for "very comfortable".

During the 6MWT was reported the distance, in meters, at the maximum speed which a patient could walk for 6 min.

Intra-abdominal pressure (IAP) was evaluated measuring the height of the urine column above the abdominal wall when the patient was in supine position. The data were collected only for the patients underwent epidural anesthesia and were registered on daily basis.

Risk of bias

The methodological quality of all included studies is evaluated with the second version of the Cochrane risk-of-bias tool for randomized trials (RoB 2) (Fig. 1).[9]

Statistical analysis

Data were reported in descriptive statistics. Meta-analysis was performed using Review Manager 5.3 (Cochrane Collaboration, Oxford, England). Estimated effect measures were calculated for event-related outcomes as odds ratio (OR) and reported with 95% confidence interval (CI). Standard mean differences with a 95% confidence interval (95% CI) by calculating random effect measures were used to analyze continuous variables presented in different scales. If RCTs reported medians and ranges instead of means and standard deviations we converted them by using the method recently published by Hozo et al.[10] The Z-test for overall effect and relative two-sided p-value were assessed. The statistical significance was set at the 0.05 probability value.

Results

Studies selection

The first electronic search gave 1995 records. After the analysis of abstracts, full-texts and references, potentially relevant papers were identified and finally 5 studies,[4–8] including a total of 281 patients, met the inclusion criteria and have been incorporated in our review (Fig. 2).

Characteristics of studies

The studies have been run in West countries: 3 (60%) in Europe,[4,6,7] 1 in the United States of America (USA)[8] and 1 in Canada.[5]

Demographic findings

Demographic characteristics were summarized in Table 1.

Mean age ranged between 57 and 65 years for Binder group and between 57.3 and 63 years for non-binder group (data from 4 studies,[4,5,7,8] 235 patients), with no statistical differences ($p = 0.30$).

Binder patients had a lower mean BMI (varying between 22.9 and 27.54 kg/m^2) than non-binder patients (mean BMI varied between 25.6 and 28 kg/m^2) ($p = 0.01$): these results were available for 181 patients from 3 studies.[4,5,7]

All procedures were performed in elective settings. The indication for surgery was reported in two series[4,5]: 57 (50.4%) patients underwent oncological procedures, while 56 (49.6%) patients have been submitted to not-oncological surgery.

The length of anesthesia (LOA) was reported in 3 studies[4,5,7] for a total of 181 patients: LOA was shorter in binder group (mean LOA ranged between 239 and 276 min in binder group versus 258–311.4 min in non-binder group) ($p = 0.01$).

Details on the length of the abdominal incision were reported in 2 studies[4,8] (138 patients) and varied between 14 and 20.6 cm in binder group and 17–19 cm in non-binder group, with no statistical differences ($p = 0.9$).

Clay et al.[6] reported a mean value of 14.7 (±5.8) cm H_2O in IAP for 8 binder patients and of 11.9 (±5.5) cm H_2O in IAP for 10 non-binder patients, with no statistical differences ($p = 0.3$)

The Length of stay (LOS) was reported in 3 studies[5,7,8] for a total of 151 patients: the mean LOS ranged between 3.87 and 10.1 days in binder group and 3.67–14 days in non-binder group, with no statistical differences ($p = 0.55$).

Outcomes evaluation

Postoperative pain

Data on POP were reported in all studies[4–8] for a total of 281 patients; however, Larson et al.[8] did not report the standard deviation of their results, and so the study was not considered for this item.

POP results were available for all study for the I postoperative day, for three study for the III and the V postoperative day[5–7] (Fig. 3).

Please cite this article as: Ossola P et al., Evidence on postoperative abdominal binding: A systematic review with meta-analysis of randomized controlled trials, The Surgeon, https://doi.org/10.1016/j.surge.2020.07.003

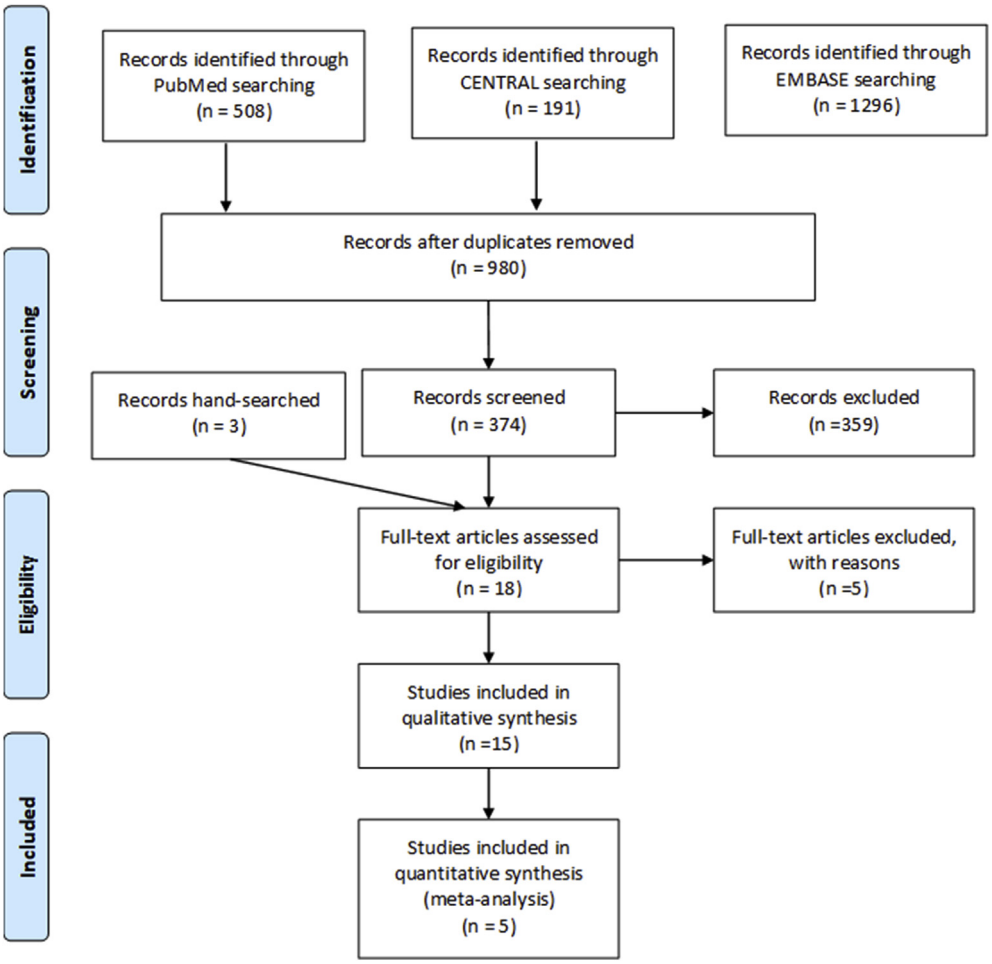


Fig. 2 – PRISMA flow-chart for included studies.

POP was lower in binder group on the I ($p = 0.01$) and on the V ($p < 0.01$) postoperative day; no statistical differences were noted on the third postoperative day.

6MWT

6MWT was reported in 2 studies[4,5] for a total of 144 patients; the test was registered preoperatively in all study, Arici et al.[4] reported also on first, on IV and on VII postoperative day, with a significant difference on the IV postoperative day in favour of binder group ($p < 0.01$). Cheifetz et al.[5] analyzed results on the third and fifth postoperative day, with a statistical difference on the V postoperative day ($p = 0.01$) (Fig. 4).

Respiratory assessment

FEV_1

FEV_1 was determined in four studies,[4–7] for a total of 225 patients. Clay et al.[6] reported incomplete data and was excluded from our analysis. FEV_1 was measured in four studies[4–7]

Table 1 – Demographic characteristics of included studies.

Author, year	Origin	Binder, *n*	Non-binder, *n*	Age,[a] mean (SD)		BMI,[b] mean (SD)		LOI,[c] mean (SD)	
				Binder	Non-binder	Binder	Non-binder	Binder	Non-binder
Arici, 2016[4]	Turkey	42	42	58.5 (±14.1)	57.3 (±17.6)	27.5 (±4.1)	27.8 (±4.4)	20.6 (±4.9)	19 (±3.7)
Cheifetz, 2008[5]	Canada	30	30	57.5 (±16.8)	59 (±18.4)	26 (±4.1)	28 (±5)	n.a.	n.a.
Clay, 2014[6]	Sweden	21	25	n.a.	n.a	n.a	n.a	n.a	n.a
Fagevik, 2009[7]	Sweden	18	19	65 (±11)	63 (±14)	22.9 (±3)	25.6 (±3)	n.a.	n.a.
Larson, 2009[8]	USA	29	25	61 (±19)	59 (±14)	n.a.	n.a.	14 (±5)	18.3 (±6.9)

n.a., not available.
[a] Reported in years.
[b] Reported in Kg/m.^{2}.
[c] Length of incision reported in cm.

Please cite this article as: Ossola P et al., Evidence on postoperative abdominal binding: A systematic review with meta-analysis of randomized controlled trials, The Surgeon, https://doi.org/10.1016/j.surge.2020.07.003

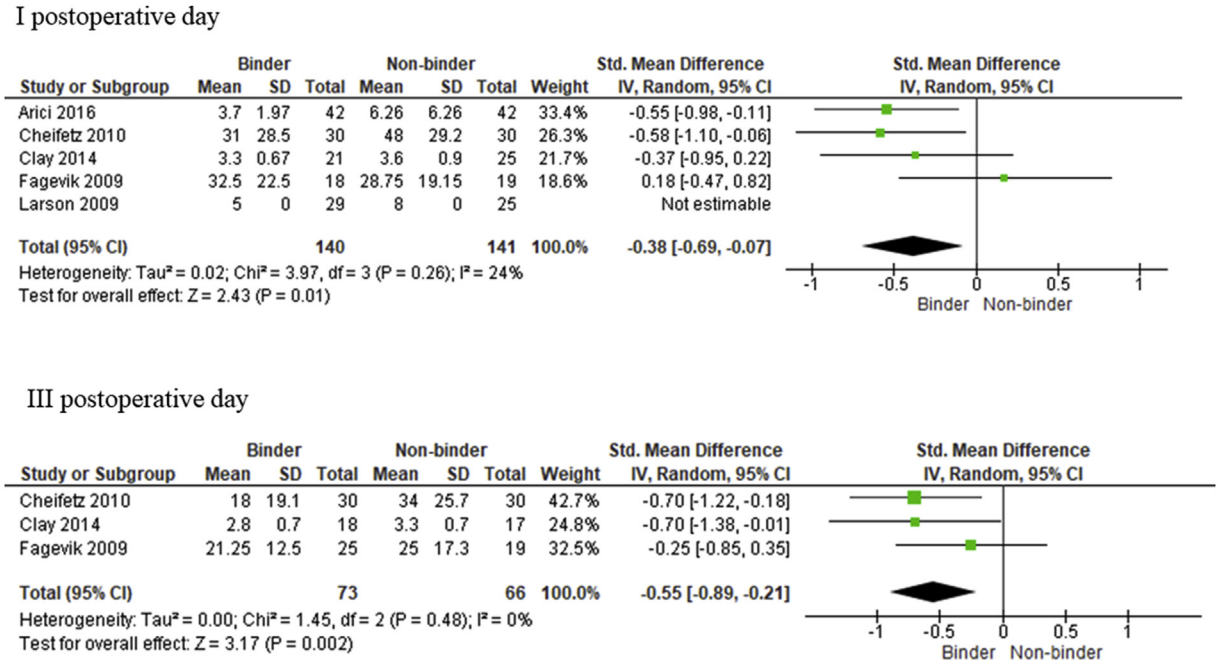


Fig. 3 – POP during the I and V postoperative days.

preoperatively, Arici et al.[4] also on the first, on the fourth and on the seventh postoperative day, with no statistical differences. Cheifetz et al.[5] and Fagevik et al.[7] analyzed results preoperatively, on the third and on the fifth postoperative day. No statistical differences were noted in preoperative FEV_1 ($p = 0.96$), neither on the first ($p = 0.37$), on the third ($p = 0.86$) and on the fifth ($p = 0.74$) postoperative day, analyzing all studies.

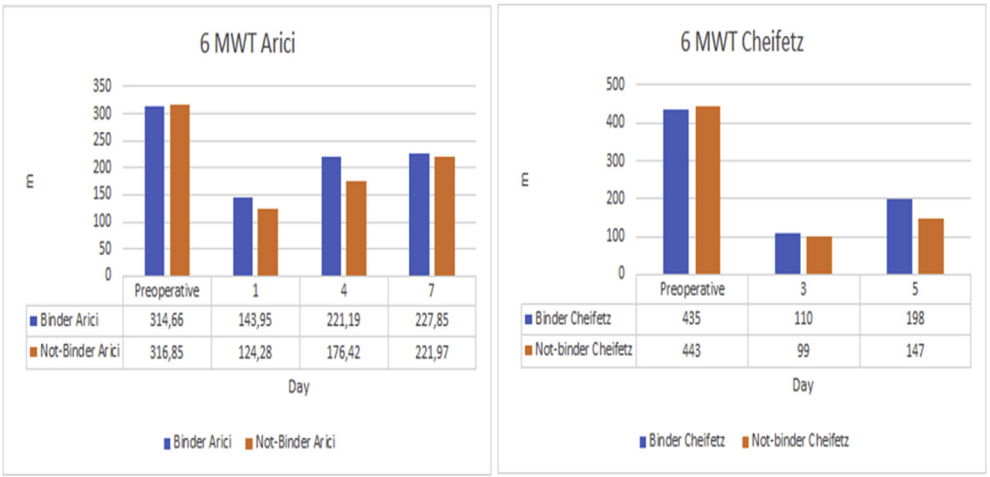
FVC

FVC was determined in four studies,[4–7] for a total of 225 patients. Clay et al.[6] was excluded from our analysis for not completed data available. FEV_1 was measured in four studies[4–7] preoperatively, Arici et al.[4] also on the first, on the fourth ($p = 0.40$) and on seventh ($p = 0.7$) postoperative day, with no statistical differences. Cheifetz et al.[5] and Fagevik et al.[7] analyzed results preoperatively, on the third and on the fifth postoperative day. No statistical differences were noted in preoperative FVC ($p = 0.39$), neither on the first ($p = 0.29$), on the third ($p = 0.25$) and on the fifth ($p = 0.8$) postoperative day, analyzing all studies.

Comfort

The degree of binder comfort was reported in 2 studies[4,7] for a total of 60 patients.

Fagevik et al.[7] reported the patients' comfort as median value and ranged on the first, the third and the fifth



m: distance covered in 6 minutes expressed in meters

Fig. 4 – 6MWT findings during postoperative period.

Please cite this article as: Ossola P et al., Evidence on postoperative abdominal binding: A systematic review with meta-analysis of randomized controlled trials, The Surgeon, https://doi.org/10.1016/j.surge.2020.07.003

Table 2 – Degree of postoperative comfort in binder patients reported by Arici et al.[4]

	POD 1		POD 4		POD 7	
	n	%	*n*	%	*n*	%
Uncomfortable	–	–	–	–	–	–
Slightly uncomfortable	–	–	–	–	–	–
Satisfactory	1	2.4	–	–	–	–
Comfortable	8	19	6	14.3	4	9.5
Very comfortable	33	78.6	36	85.7	38	90.5

postoperative day. On the first postoperative day the comfort was estimated as 4 (range 2–5) or "very comfortable", on the third postoperative day as 4 (range 0–5), on the fifth postoperative day as 3 (0–5) or "comfortable".

Arici et al.[4] reported results on the first, the fourth and on the seventh postoperative day that are summarized in Table 2.

Discussion

The use of postoperative abdominal binder is not well encoded, but is often applied after major surgery. The aim of our study is to evaluate the benefits in wearing a binder after a midline laparotomy.

Even some reviews have been published in the past,[11–13] this is the first meta-analysis conducted to compare RCTs on this topic.

Bouvier et al.[11] has submitted to 50 French surgeons, working in different Surgical Departments, a questionnaire about the habit to prescribe abdominal binder after surgical procedures. In this interview resulted that 94% of the surgeons were apt to prescribe the binder, and the reasons were to avoid parietal complications (31.9%), for the patient's comfort (14.9%), and for both the reasons (51.1%). Another interesting finding was the length of the prescription that in large part (48.9%) was for 1 months after surgery.

Pain is an extremely subjective sensation with emotional, physical, biological, and cultural implications: for these characteristics POP is difficult to quantify objectively.[14] Furthermore in some cases POP is not evaluable (i.e. unconscious patients). The management of POP is vital: in fact, POP is well recognized to alter the metabolic response to surgical damage, principally increasing the sympathetic response. This reaction lead to augmented oxygen demand and vasoconstriction, hemodynamical alterations that affect organs functions and could delay the recovery.[14] Many pain assessments are available, but the most useful, in case of acute pain, is by interviewing the patient. The VAS scale (reported in all RCTs analyzed in this paper) and the numerical rating scale (NRS) are the most used, but at the same time, the risk of bias is elevated. Another system to quantify pain level is the dosage of anti-pain drugs that patients need. More objectively, acute pain could be identified indirectly by the variation of heart rate, respiration rate, blood pressure, and behavior or cognitive status. Furthermore, blood levels of stress induced hormones, like cortisol, could be used to determinate a painful situation. In this meta-analysis, the pain assessment is evaluated with the use of VAS. The use of abdominal binder seems to reduce POP.[1,15] We reported a significative pain reduction on the first and on the fifth postoperative day in binder group: this device should be not considered as a replacement of pain therapy, but should be associated to anti-pain drugs to improve postoperative rest. Heterogeneity in reporting in postoperative protocol for POP was noted. Arici et al.[4] reported a postoperative protocol for POP management until IV POD, using meperidine on the I POD and in case of VAS > 7, and dexketoprofen trometamol during the II and III POD. In the series of Fagevik et al.,[7] all patients underwent epidural anesthesia, as the most patients reported by Clay et al.[6] and Larson et al.[8] did not report any pain protocol in their papers.

6MWT was considered one of the most used tools to measure physical functions in research studies and in clinical settings.[16] In our series 2 studies[4,5] reported their results on physical functions: the 6MWT was performed before surgery for a baseline data, Arici et al.[4] registered the test also on the first, the fourth and the seventh postoperative day, Cheifetz at al[5] on the third and the fifth postoperative day. The overall results indicated that binder group walked for a longer distance compared to the non-binder, during the fourth and the fifth postoperative day. It is well known that a rapid mobilization out of the bed prevents postoperative complications as pneumonia and venous thromboembolism.

Regarding the degree of comfort, 2 studies[4,7] reported that the binder is well tolerated, and patients had positive feedback measured with the "Fagevik comfort scale".[7]

We reviewed the Literature to evaluate the modifications on pulmonary function wearing an abdominal binder after surgery. The respiratory physiology is dominated by a restrictive deficit with a severe (50–60%) reduction in vital capacity and a reduction (20–30%) also in FVC.[5] It is thought that wearing a postoperative binder, increasing the abdominal pressure, should impair the respiratory function, already affected from the restrictive postoperative deficit. From our results of FEV_1 and FVC on the first, third, fourth, fifth and seventh postoperative day, no statistical differences between the two groups (binder vs non-binder) were identifiable.

A limitation in the use of abdominal binder was the thinking that the reduction in the abdominal compliance, for the pressure of the binder, could lead to an increase of IAP until determinate an iatrogenic abdominal compartment syndrome. However, we reported the results of Clay et al.[6] in which no differences between the two groups (binder vs non-binder) were noted.

Bouvier et al.[11] reported a mean cost of a postoperative abdominal binder as 110 €; however, no one of the RCTs analyzed this topic. By web search, the cost of the abdominal binder could range from about 15 € to 80 € depending on quality of material and the vendor.

No data on obese (BMI > 30 kg/m^2) patients are reported in the reviewed studies. Obesity determined high morbidity rate with cardiac and renal failure, obstructive pulmonary disorder; surgical site infection rate results higher in obese patients principally for the lower subcutaneous blood perfusion with relative local hypoxemia and suboptimal antibiotics concentration.[16]

This condition could lead to an abdominal wall dehiscence, but further studies are necessary to identify the impact of the abdominal binder in obese patients. In the Enhanced Recovery

Please cite this article as: Ossola P et al., Evidence on postoperative abdominal binding: A systematic review with meta-analysis of randomized controlled trials, The Surgeon, https://doi.org/10.1016/j.surge.2020.07.003

After Surgery (ERAS) program is planned an early mobilization after surgery: particularly on the first, second and third postoperative day. This protocol aimed to reduced postoperative complications (i.e. postoperative pneumonia, reduction of skeletal muscles mass, thromboembolic complications).[17,18] So, the use of an abdominal binder, reducing the POP on I and V postoperative day, should improve the early mobilization in patients undergone a midline laparotomy.

This study presents some limitations: 1. the number of RCTs is limited, 2. the sample is small, 3. studies are heterogenous for the surgical procedures, and for pain therapy, 4. no one study reported result about seroma formation, postoperative *eventratio* or short/long term incisional hernia rate between the two groups.

Conclusion

In conclusion the use of elastic abdominal binder during postoperative mobilization is well tolerated, reduces pain, increases physical activity, and seems to not affect pulmonary functions, in elective settings.

The born of specific protocol and a short preoperative training on the use and the wearing technique of this medical device, could be necessary to reach all benefits in the use of abdominal binder.

Further RCTs are necessary to investigate long term complication as seroma or incisional hernia, associated to a cost-effectiveness analysis.

Funding

No grants or funding have been received for the drawing up of the present paper.

Ethical approval

Not applicable. This article does not contain any studies with human or animals participants performed by any of the authors.

Informed consent

Not applicable. For this type of study formal consent in not required.

Declaration of Competing Interest

The authors declare that they have no conflict of interests.

Acknowledgements

We thank Enrico Ossola for the precious advice and suggestion during the revision of the manuscript.

REFERENCES

1. Zhang HY, Liu D, Tang H, Sun SJ, Ai SM, Yang WQ, et al. The effect of different types of abdominal binders on intra-abdominal pressure. *Saudi Med J* 2016;**37**(1):66–72. https://doi.org/10.15537/smj.2016.1.12865.
2. Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gøtzsche PC, Ioannidis JP, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate healthcare interventions: explanation and elaboration. *Ann Intern Med* 2009;**18**(151):W65–94.
3. Goossen K, Tenckhoff S, Probst P, Grummich K, Mihaljevic AL, Büchler MW, et al. Optimal literature search for systematic reviews in surgery. *Langenbecks Arch Surg* 2018;**403**(1):119–29.
4. Arici E, Tastan S, Can MF. The effect of using an abdominal binder on postoperative gastrointestinal function, mobilization, pulmonary function, and pain in patients undergoing major abdominal surgery: a randomized controlled trial. *Int J Nurs Stud* 2016;**62**:108–17. https://doi.org/10.1016/j.ijnurstu.2016.07.017.
5. Cheifetz O, Lucy SD, Overend TJ, Crowe J. The effect of abdominal support on functional outcomes in patients following major abdominal surgery: a randomized controlled trial. *Physiother Can* 2010;**62**(3):242–53. https://doi.org/10.3138/physio.62.3.242. Summer.
6. Clay L, Gunnarsson U, Franklin KA, Strigård K. Effect of an elastic girdle on lung function, intra-abdominal pressure, and pain after midline laparotomy: a randomized controlled trial. *Int J Colorectal Dis* 2014;**29**(6):715–21. https://doi.org/10.1007/s00384-014-1834-x.
7. Fagevik OM, Josefson K, Wiklund M. Evaluation of abdominal binder after major upper gastrointestinal surgery. *Adv Physiother* 2009;**11**(2):104–10. https://doi.org/10.1080/14038190802141073.
8. Larson CM, Ratzer ER, Davis-Merritt D, Clark JR. The effect of abdominal binders on postoperative pulmonary function. *Am Surg* 2009 Feb;**75**(2):169–71.
9. Sterne JAC, Savović J, Page MJ, Elbers RG, Blencowe NS, Boutron I, et al. RoB 2: a revised tool for assessing risk of bias in randomised trials. *BMJ* 2019;**366**:l4898.
10. Hozo SP, Djulbegovic B, Hozo I. Estimating the mean and variance from the median, range, and the size of a sample. *BMC Med Res Methodol* 2005;**5**:13.
11. Bouvier A, Rat A, Drissi-Chbihi F, Bonnetain F, Lacaine F, Mariette C, et al. Abdominal binders after laparotomy: review of the literature and French survey of policies. *Hernia* 2014;**18**(4):501–6. https://doi.org/10.1007/s10029-014-1264-2.
12. Rothman JP, Gunnarsson U, Bisgaard T. Abdominal binders may reduce pain and improve physical function after major abdominal surgery – a systematic review. *Dan Med J* 2014;**61**(11):A4941.
13. Hall AB, Northern D. Effect of abdominal binders on pulmonary mechanics with implications for the military surgical population. *J Surg Educ* 2012;**69**(1):34–6. https://doi.org/10.1016/j.jsurg.2011.06.001.
14. Samaraee AA, Rhind G, Saleh U, Bhattacharya V. Factors Contributing to poor post-operative abdominal pain management in adult patients: a review. *Surgeon* 2010;**8**(3):151–8. https://doi.org/10.1016/j.surge.2009.10.039. Epub 2010 Feb 12.
15. Stoker KC. Use of abdominal binders for postoperative pain after gastrointestinal surgery: an integrative review. *J Perianesth Nurs* 2019;**34**(4):829–33. https://doi.org/10.1016/j.jopan.2018.10.010.
16. Solway S, Brooks D, Lacasse Y, Thomas S. A qualitative systemic overview of the measurement properties of

Please cite this article as: Ossola P et al., Evidence on postoperative abdominal binding: A systematic review with meta-analysis of randomized controlled trials, The Surgeon, https://doi.org/10.1016/j.surge.2020.07.003

functional walk tests used in cardiorespiratory domain. *Chest* 2001;**119**:256–70.
17. Wahl TS, Patel FC, Goss LE, Chu DI, Grams J, Morris MS. The obese colorectal surgery patient: surgical site infection and outcomes 2018;**61**(8):938–45. https://doi.org/10.1097/DCR.0000000000001085.
18. Pędziwiatr M, Mavrikis J, Witowski J, Adamos A, Major P, Nowakowski M, et al. Current status of enhanced recovery after surgery (ERAS) protocol in gastrointestinal surgery. *Med Oncol* 2018;**35**(6):95. https://doi.org/10.1007/s12032-018-1153-0. 9.

Please cite this article as: Ossola P et al., Evidence on postoperative abdominal binding: A systematic review with meta-analysis of randomized controlled trials, The Surgeon, https://doi.org/10.1016/j.surge.2020.07.003