Effectiveness of Osteopathic Manipulative Therapy for Managing Symptoms of Irritable Bowel Syndrome: A Systematic Review

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Context: Irritable bowel syndrome (IBS) is a common and often lifelong functional gastrointestinal disorder. There is a scarcity of effective management options for IBS.

Objective: To assess the effectiveness of osteopathic manipulative therapy (OMTh) for managing the symptoms of IBS.

Data Sources: Articles without language or publication-date restriction were searched in PubMed, Embase, Cochrane Library, PEDro, OSTMED.DR, and Osteopathic Research Web. Search terms included *irritable bowel syndrome*, *IBS*, *functional colonic disease*, *colon irritable*, *osteopath**, *osteopathic manipulation*, *osteopathic medicine*, *clinical trial*, and *randomized clinical trial*. Experts in the field of visceral osteopathy were also contacted to identify additional studies.

Study Selection: The authors evaluated randomized controlled trials (RCTs) of OMTh for IBS in adults in whom IBS was diagnosed using Rome (I-III) criteria. If OMTh was not the sole intervention in the intervention group and if the same additional interventions were not applied to the control group, the study was excluded.

Data Extraction: Citation identification, study selection, and data extraction were independently undertaken by 2 reviewers with a data extraction form from the Cochrane Collaboration. A consensus method was used to resolve disagreements concerning the assessment of the methodologic quality of the RCTs that were reviewed.

Results: The search identified 10 studies that examined OMTh for patients with IBS; 5 studies (204 patients) met the inclusion criteria. All studies were assessed as having low risk of bias according to the Cochrane Collaboration criteria, although there was heterogeneity in the outcome measures and control interventions. Three studies used visual analog scales for abdominal pain, whereas others used the IBS severity score and the Functional Bowel Disorder Severity Index. A variety of secondary outcomes were used. All studies reported more pronounced short-term improvements with OMTh compared with sham therapy or standard care only. These differences remained statistically significant after variable lengths of follow-up in 3 studies.

Conclusion: The present systematic review provides preliminary evidence that OMTh may be beneficial in the treatment of patients with IBS. However, caution is required in the interpretation of these findings because of the limited number of studies available and the small sample sizes.

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Irritable bowel syndrome (IBS) is a chronic, recurring gastrointestinal illness that varies in symptoms and characteristics.[1,2] Approximately 10% of the population has IBS at any given time—about 200 people per 100,000 receive an initial diagnosis of IBS each year.[2] The prevalence of IBS in North America ranges from 3% to 20%, with most prevalence estimates ranging from 10% to 15%.[3] It is more commonly diagnosed in people aged 50 years or older, and it occurs more frequently in women, at a women-to-men ratio of 2:1 to 4:1.[4,5]

Symptoms of IBS are abdominal pain and discomfort associated with changes in bowel habits, such as increased frequency of stool, abnormal stool form, straining during defecation, defecation urgency, feeling of incomplete defecation, passage of mucus, and bloating.[6] The disease is diagnosed using the Rome Criteria (I-III), a globally recognized classification system.[7] Individuals with IBS tend to have substantial functional impairments, higher levels of disability,[4,8] and limitations in quality of life.[5] Interaction between motor and sensory dysfunctions seems to cause the symptoms of IBS, but this theory has yet to be definitively confirmed. Factors that affect luminal function—such as food, intestinal expansion, inflammation, bacteria, and provocative environmental influences (psychosocial stress)—seem to affect the gastrointestinal motility and visceral sensitivity in persons with IBS.[9] This gastrointestinal sensorimotor dysfunction can cause a deregulation in the brain-gut axis, which is the neural processing region between the intestines and brain.[10]

The frequency and intensity of symptoms determine the level of medical treatment for patients with IBS, which can range from no or very little treatment to emergency treatment. Conventional therapies for patients with IBS generally involve the motor, sensory, or central gastrointestinal nervous system and include lactose reduction, fiber supplementation, bulking agents, laxatives, antispasmodics, antibiotics, psychological interventions, or antidepressants.[11-13] Whereas antispasmodics,[14,15] psychological interventions,[16] and antidepressants[17] have shown some benefits in the management of IBS, fiber supplementation,[18] stimulating laxatives,[19] and bulking agents[20] have shown little therapeutic value in randomized controlled trials (RCTs),[21] despite being used often for disease management.[22] Further, the efficacy of these therapies varies from study to study,[23,24] and a review in 2005 by Quartero et al[25] suggested that evidence for the efficacy of these therapies is weak. In light of the lack of reliable and effective medications for the management of IBS, there is a growing interest in complementary and alternative forms of therapy.[26]

Osteopathy is a complementary health approach that emphasizes the role of the musculoskeletal system in health and promotes optimal function of the tissues of the body by using a variety of manual techniques to improve the function of the body.[27] Outside the United States, osteopathy is gaining popularity for the management of certain illnesses, including gastrointestinal disorders, and a number of peer-reviewed studies[28-31] have examined the effect of osteopathic manipulative therapy (OMTh) for patients with IBS. However, to our knowledge, no systematic review or appraisal of these studies has been performed.

Because a standard for the management of IBS is lacking, the clinical effects of OMTh were examined in the current systematic review. Our objective was to systematically identify and appraise RCTs that used OMTh interventions to manage symptoms of IBS in adult patients.

Methods

The current systematic review included RCTs with OMTh interventions on adult (aged 18 years or older) IBS patients whose IBS was diagnosed using Rome (I–III) criteria. The inclusion criteria for studies and the method of analysis were specified in advance of the literature search. The search strategy was not limited by language or restricted to studies published in the major databases. As recommended by the Cochrane Collabora-

tion,[32] the search included unpublished studies from the "gray literature" (ie, research that is not published in easily accessible journals or databases, including conference proceedings that print abstracts of research and unpublished theses). If OMTh was not the sole intervention in the intervention group, the same additional interventions had to be applied to the control group; otherwise, the study was excluded. The nature of the intervention in the control group was not restricted—placebo, standard medical care, or other therapies were acceptable.

A literature search for relevant studies without year restriction was conducted in October 2013 in the following electronic databases: PubMed (http://www.ncbi.nlm.nih.gov/pubmed), Embase (http://www.embase.com), Cochrane Library (http://www.thecochranelibrary.com), PEDro (http://www.pedro.org.au/), OSTMED.DR (http://ostmed-dr.com/), and Osteopathic Research Web (http://www.osteopathic-research.com/). We used the following search terms: *irritable bowel syndrome*, *IBS*, *functional colonic disease*, *colon irritable*, *osteopath**, *osteopathic manipulation*, *osteopathic medicine*, *clinical trial*, and *randomized clinical trial*. In addition to the electronic searches, we contacted experts in the field of visceral osteopathy to identify additional studies.

Citation identification, study selection, and data extraction were independently undertaken by 2 reviewers (A.M., H.F.) using a data extraction form used by other Cochrane reviews in this field.[32-35] The retrieved records were screened by title and abstract. Eligible studies were read in full text and independently evaluated for inclusion. If the reviewers disagreed, they attempted to resolve the issue through discussion. If the disagreement persisted, a third reviewer was consulted. The third reviewer then discussed the issues with the 2 reviewers until a unanimous agreement was reached.

For each study included in the review, we extracted information about study design, participant demographics, intervention and control protocols, inclusion and exclusion criteria, outcome measurements, follow-up period, and reported adverse events.

After data extraction, the same reviewers independently assessed the methodologic quality of the RCTs included in the review using a tool that was updated by the Cochrane Back Review Group[36] and based on the Cochrane Risk of Bias tool.[32] A consensus method was used to resolve disagreements concerning the assessment of the methodologic quality of the studies. Each criterion on the Risk of Bias tool was scored as low risk, high risk, or unclear. Studies that met 6 categories of Cochrane tool criteria were deemed as having low risk of bias.

Results

Using our search strategy, we identified 5 studies suitable for inclusion in the present systematic review (*Figure*).[29-31,37,38] One hundred three studies were initially identified, but 93 were excluded because of inappropriate content or duplication. For example, Brice et al[28] was excluded because a nonrandom method of group allocation was used. Another 4 studies were excluded because they were case studies,[39,40] did not have a clear control group or control intervention period,[41] or were available in abstract form only.[42] The included studies were completed in the period from 1998 to 2013. Altogether, 204 patients had been included in the 5 studies considered.

The evaluation of methodologic quality using the risk of bias tool[36] is summarized in *Table 1*. The methodologic quality was regarded as being high for all included studies, with all studies having low risk in at least 6 categories. In the studies by Attali et al,[31] Florance et al,[29] Müller et al,[38] and Brisard et al,[37] the participants were blinded to the procedure but the blinding was not tested, so the criteria for blinding of patients and outcome assessors were scored as having an unclear risk of bias, even though effective blinding seemed probable. A score of low risk of bias for randomization was possible only when the randomization procedure was fully described.[32] In the study by Brisard et al,[37] the randomization procedure was assessed as high risk of bias because the allocation was randomized in blocks of 4. Hundscheid et al[30]

compared OMTh with standard medical care, whereas the other included studies[29,31,37,38] compared OMTh with a sham control treatment (*Table 2*). All studies reported substantial improvements in the OMTh groups, albeit using different outcome measures (*Table 3*).

In the studies by Müller et al[38] and Brisard et al[37]—which were 2 of the 3 studies that used a visual analog scale (VAS) for pain—mean pain levels dropped from 64.5 to 12.9 in the OMTh group and from 63.7 to 49.7 in the sham control group ($P<.01$), and from 50.7 to 33.4 and 56.5 to 62.3, respectively ($P=.02$). Attali et al[31] used an RCT crossover design and reported a statistically significant decrease in VAS score for abdominal pain for both interventions after the first 5-week period, but only in the OMTh group (3.50 to 2.49; sham, 3.02 to 3.06) after the second period. Attali et al[31] also reported statistically significant changes in rectal sensitivity to distention after OMTh ($P<.01$) but not sham treatment, as measured by tolerance to a progressively air-filled latex balloon (ie, the greater the air pressure of the balloon that was tolerated, the less sensitive the rectum). There was no statistically significant difference in colonic transit time—which was measured by means of radiopaque markers within gelatin capsules—between OMTh or sham treatment.

Florance et al[29] used the IBS severity score as the main outcome measurement. They observed a more pronounced short-term improvement (baseline to day 7) in the treatment group than in the control group, from 300 to 196 and from 275 to 244, respectively ($P=.01$). At day 28, however, the severity score was almost identical in both groups (224 vs 228, $P=.8$). Hundscheid et al[30] reported an improvement of the Functional Bowel Disorder Severity Index from 174 to 74 in the treatment group and from 171 to 119 in the control group on standard medical care only ($P=.02$) over a 6-month period.

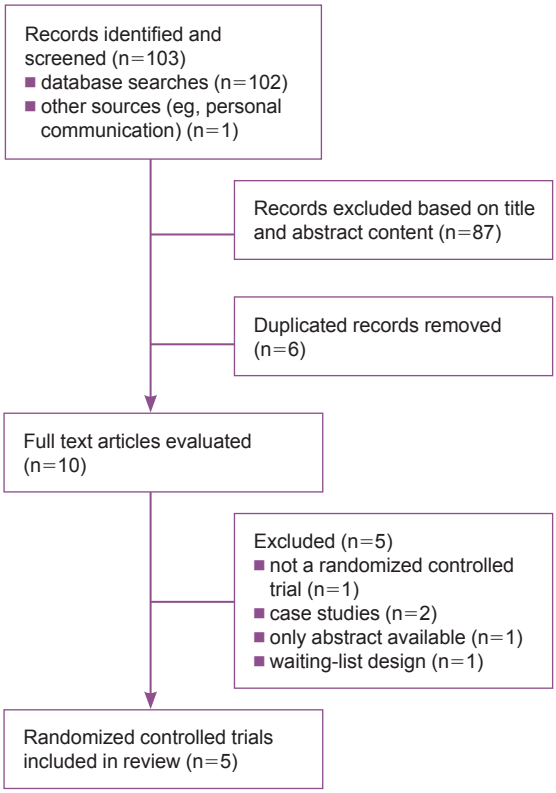

Figure.
Flow chart of the selection process used to identify randomized controlled trials on the use of osteopathic manipulative therapy for patients with irritable bowel syndrome.

Table 1.
Risk of Bias in the Reviewed Studies, as Measured by Cochrane Collaboration Criteria[46]

Criteria	Attali et al (2013)[31]	Florance et al (2012)[29]	Hundscheid et al (2007)[30]	Müller et al (2002)[38]	Brisard et al (1998)[37]
Randomized[a]	low	low	low	low	high[e]
Allocation concealed	low	low	low	low	unclear
Patients blinded[b]	unclear	unclear	high	unclear	unclear
Care providers blinded[c]	high	high	high	high	high
Outcome assessors blinded[d]	unclear	unclear	high	high	high
Drop-outs described + acceptable	low	low	low	low	low
Free of selective outcome report	low	low	low	low	low
Groups similar at baseline	high	low	unclear	low	low
Co-intervention avoided or similar	unclear	low	low	low	low
Compliance acceptable	low	low	low	low	low
Used intention-to-treat analysis	low	low	high	low	low
Similar timing outcome	low	low	low	low	low

[a] Low risk of bias possible only if the randomization procedure was described.
[b] Low risk of bias possible only if blinding was tested among the participants.
[c] In osteopathic manipulative therapy, care provider blinding is not possible.
[d] For patient-reported outcomes, a low risk of bias was possible only if there was a low risk of bias for participant blinding.
[e] Patient population was randomized in blocks of 4. In a correct randomization procedure, every participant has a chance of >0 to be assigned to the intervention or the control group. Because this is not given in a block randomization of 4 (ie, group allocation changed after 4 participants), the authors rated the randomization as high risk.

Discussion

The studies assessed in the present systematic review[29-31,37,38] suggest that OMTh can benefit patients with IBS. These studies reported that OMTh reduced the symptoms of IBS, such as abdominal pain, constipation, diarrhea, and improved general well-being. No study reported any serious or statistically significant adverse events from OMTh.

All reviewed studies allowed therapy to be individualized at the judgment of the treating osteopath, without any technique restrictions or standardized treatment protocols. The techniques chosen were based on the treating examiner's opinion of what techniques would be most appropriate for a given patient. This pragmatic approach best represents "real world" osteopathic practice, as opposed to treatment after an established study protocol that applies a single OMTh technique or set of techniques. This approach also supports the osteopathic tenet that the body is interconnected and that distant regions may influence the function of other regions, depending on their biomechanical, neurologic, and circulatory connections.[27] In 4 of the studies reviewed,[29,31,37,38] OMTh was applied to different body regions. Florance et al[29] and Attali et al[31] focused their

Table 2.
Characteristics of the Studies of Irritable Bowel Syndrome (IBS) That Were Analyzed in the Present Systematic Review

Characteristic	Attali et al (2013)[31]	Florance et al (2012)[29]	Hundscheid et al (2007)[30]	Müller et al (2002)[38]	Brisard et al (1998)[37]
Country of Origin	France	France	Netherlands	Germany	France
Study Design	RCT (cross-over)	RCT	RCT	RCT	RCT
Study Objective	To evaluate the effectiveness of visceral osteopathy for IBS	To evaluate the effect of osteopathy on the severity of IBS in a randomized sham-controlled trial	To evaluate the effects of osteopathic treatment in IBS	The influence of osteopathic treatment on IBS regarding pain and different functional disorders	To evaluate the effect of osteopathy in IBS regarding pain and different functional disorders
Treating Osteopaths, No.	1	1	1	3	10
Inclusion and Exclusion Criteria Reported	Yes	Yes	Yes	Yes	Yes
Technique Restriction	Focus on abdomen and sacrum	No (focus on spine/abdomen)	No	No (focus on 4 body regions)	No (focus on 4 body regions)
Outcome Measurement	VAS for 1. pain 2. constipation 3. diarrhea 4. abominal distension 5. rectal sensitivity 6. colonic transit time	1. IBS severity score 2. impact of abdominal pain severity on QoL 3. FIS score 4. HAD score 5. BDI score	1. symptom score 2. IBSQoL 2000 3. FBDSI	1. VAS 2. diarrhea 3. constipation 4. gas 5. meteorism	1. VAS 2. diarrhea 3. constipation 4. gas
Intervention Group					
Patients, No.	31	20	19	29	22
Age, y, mean	50	47.5	46.5	50	42.1
Sex					
Men, No.	8	5	NA	5	3
Women, No.	23	15	NA	23	20[a]
OMTh, Sessions, No.	3	2	5	5	5
Control Group					
Patients, No.	NA[c]	10	17	25	19
Age, y, mean	NA[c]	47.5	41	47	44.3
Sex					
Men, No.	NA[c]	2	NA	4	4
Women, No.	NA[c]	8	NA	21	15
Treatment sessions, No.[b]	3	2	NA	5	5
Treatment Duration	6 wk	7 d	12 wk	75 d	75 d
Follow-up Duration	1 y after treatment	4 wk after treatment	6 mo after randomization	2 wk after treatment	2 wk after treatment
Adverse Events	None	None	None	None	None

[a] This number includes dropouts.
[b] All control groups were given sham treatments, except for that of Hundscheid et al, which was given standard medical care only.

Abbreviations: BDI, Beck Depression Index; FBDSI, Functional Bowel Disorder Severity Index; FIS, Fatigue Impact Scale; GIQLI, Gastrointestinal Quality of Life Index; HAD, Hospital Anxiety and Depression; IBSQoL, Irritable Bowel Syndrome Quality of Life; NA, not available; QoL, quality of life; RCT, randomized controlled trial; VAS, visual analog scale.

Table 3.
Authors' Conclusions and Results From Studies in the Present Systematic Review

Study Author	Authors' Conclusion	Primary Outcome Results
Attali et al (2013)[31]	"Visceral osteopathy was associated with [statistically] significant improvements of self-reported diarrhea, abdominal distension and abdominal pain without change of constipation. Visceral osteopathy was also associated with decreased rectal sensitivity: increase in threshold, constant sensation, and maximum tolerable volume ($P<0.001$)."	VAS pain score, mean (SD) Group 1 Osteopathy: decrease from 5.73 (0.84) to 3.02 (0.59) Sham: decrease from 6.81 (0.45) to 3.50 (0.54) Group 2 Osteopathy: decrease from 3.50 (0.54) to 2.49 (0.44) Sham: increase from 3.02 (0.59) to 3.06 (0.59)
Florance et al (2012)[29]	"Osteopathy improves the severity of IBS symptoms and its impact on quality of life. Osteopathy should therefore be considered for future research as an effective complementary alternative medicine in the management of IBS symptoms."	IBS Severity score after 7 d, mean (SD) ($P=.01$) Osteopathy: decrease from 300 (71) to 196 (88) Control: decrease from 275 (91) to 244 (75) IBS Severity score after 28 d, mean (SD) ($P=.8$) Osteopathy: decrease from 300 (71) to 224 (102) Control: decrease from 275 (91) to 228 (119)
Hundscheid et al (2007)[30]	"[O]steopathic therapy is a promising alternative in the treatment of patients with IBS. Patients treated with osteopathy overall did better, with respect to symptom score and quality of life."	FBDSI after 6 mo, mean (SD) ($P=.02$) Osteopathy: increase from 174 (36) to 74 (64) Control: increase from 171 (31) to 119 (48) IBSQoL after 6 mo, mean (SD) Osteopathy: 129 (19) ($P<.01$) Control: 121 (25) (P=NS)
Müller et al (2002)[38]	"A custom-tailored osteopathic treatment series (every other week for ten weeks) focusing on the patients' actual dysfunctions can induce an almost complete short term relief of typical symptoms."	VAS pain score after 75 d, mean ($P<.01$) Within-group changes Osteopathy: 64.5 to 12.9 Control: 63.7 to 49.7
Brisard et al (1998)[37]	"This single-blind placebo controlled randomized clinical trial shows that the overall therapeutic analgesic effect, the improvement on the set of functional disorders, and the good tolerance for treatment, makes osteopathic treatment a recommended treatment for irritable bowel syndrome."	VAS pain score after 75 d, mean ($P=.02$) Difference before and after treatment Osteopathy: 50.7 to 33.4 Control: 56.5 to 62.3

Abbreviations: FBDSI, Functional Bowel Disorder Severity Index; IBS, irritable bowel syndrome; IBSQoL, inflammatory bowel syndrome quality of life; NS, not significant; OMTh, osteopathic manipulative therapy; SD, standard deviation; VAS, visual analog scale.

treatments on the abdomen and spine and the abdomen and sacrum, respectively, whereas Müller et al[38] and Brisard et al[37] focused their treatments on 4 different regions. Considering the results, we speculate that the osteopathic approach described by these authors is more effective for managing complex disorders, such as IBS, than a manual approach that targets a single anatomical region.

The physiologic mechanisms for the success of OMTh techniques in the treatment of patients with IBS are not clearly understood. In osteopathic practice, the

loss of tissue motility is thought to disturb the basic self-regulating mechanisms of the human body.[43] By using palpatory examination to evaluate tissues, the osteopath can feel motility restrictions and changes in texture and tone of the tissue, which could be relevant for the patient's symptoms. For patients with IBS, osteopathic management of abdominal organs may help normalize the supplying blood, lymphatic fluid, and autonomic balance,[44] and it might aim to restore normal motility and elasticity to the viscera or to the peritoneal structures around the viscera. Additionally, the dysfunction of the brain-gut axis[9] in IBS might be of importance because osteopathic medicine is claimed to influence the visceral and neurovegetative systems.[43] Management using OMTh may be consistent with both the concept of the brain-gut axis and the biopsychosocial model of IBS.[45] Further research is required to determine the precise mechanisms for the therapeutic effects of osteopathy.

Although the United States originated osteopathic practice and, arguably, has the greatest resources to conduct osteopathic research, only 1 US clinical trial[42] was identified in our database search. However, this trial was not included in the review because only the abstract was available. Of interest, the studies included in our review were conducted in European countries: France, Germany, Austria, and the Netherlands. The reason for the origins of these studies may arise from differences in osteopathic treatment practices. Visceral techniques—in which a practitioner contacts the viscera directly to influence function—may be more popular in Europe than in the United States, where osteopathic techniques appear to be directed more commonly at the joints and other musculoskeletal tissues.[46] Two of the 5 studies reviewed were conducted before 2002. Given the positive outcomes of those 2 studies, we expected to discover more osteopathic research worldwide in the management of IBS but that was not the case. We considered a recent study by Scheuchl et al[41] that reported OMTh in combination with standard care was superior to standard care alone. However, that study was a single-arm, waiting-list design, not an RCT, and so was not included in the present review. Similarly, Brice and Mountford[28] reported that osteopathy was more effective than standard care for patients with IBS, but their study was excluded because the method of group allocation was not completely randomized.

The methodologic quality of the studies assessed in the current review varied considerably. Although all studies reviewed met at least 6 categories of the criteria for low risk of bias, as outlined in the Risk of Bias tool of the Cochrane Back Review,[36] most studies were rated as having a high risk of bias in several categories (*Table 1*). Three of the studies[29,30,38] applied randomization procedures that had a low risk of bias, whereas 1 study[37] used a randomization procedure that had a high risk of bias. There was also marked heterogeneity between the studies for the primary outcome parameters and control interventions. Future studies should ensure that outcomes are measured using a VAS for pain and a validated instrument for functional symptoms in IBS.

For many years, the Cochrane Collaboration has suggested that researchers use search results from the "gray literature" for systematic reviews.[32] The "gray literature" includes unpublished studies from small, specialized databases and involves a manual search (ie, one that involves a bibliographic search of articles in both electronic and print journals) of professional journals and their bibliographies to find additional articles of interest.[36] Four of the 5 included studies[29-31,38] were found by searching large databases like Medline and Cochrane library. Although some studies identified in the gray literature did not meet the inclusion criteria, including 1 by Brice and Montford,[28] 1 "gray" study, by Müller et al,[37] did.

The present review has a number of limitations. Only 5 studies were included in the review, and each study had a relatively small sample size. The methodologic quality of the studies was good, although 1 study[37] used a randomization procedure that was judged to have a high risk of bias. However, there was marked heterogeneity in the studies for the outcome measures and the control inter-

vention, precluding a quantitative analysis (ie, a meta-analysis). Future studies should be performed using larger patient cohorts, more rigorous methodology that includes appropriate randomization procedures, and validated outcome measures.

Conclusion

The current systematic review of 5 RCTs indicated favorable results for OMTh compared with standard medical therapies or sham interventions in the management of IBS. Caution is required when interpreting these results, however, because of the limited number of studies available and the small sample sizes. Future studies should include VAS and a validated questionnaire in their study design so that the results of those studies could be included in future meta-analyses.

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