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Research Article

Effects of Jones' Techniques on Joints Mobility, Back Pain and Cardiac Regulation

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Abstract

Background: Jones' techniques consist of the use of an analgesic position of correction to release guarding muscles and the kinetic dysfunction. For some authors, those techniques may have an impact on pain perception and sympathetic nervous system. The aim of this study is to find clinical evidences supporting a theoretical neurological model and to evaluate jones technique effectiveness on three different axes such as mobility (measured and experienced), pain and impact on sympathetic nervous system (here on cardiac issues).

Methods: For this study 60 volunteers, 34 men and 26 women, with a mean age of 31.17 (± 9.88) were recruited. This study was a simple-blind randomised trial with an experimental group (N=30) in which a jones technique for the normalisation of the 4th thoracic vertebra in right rotation was performed and a control group (N=30) which stayed steadily for an equivalent duration. There were no significant differences of sex (17 men and 13 women in each) or age (F=1.76; NS) between the two groups.

Results: Results show a significant effectiveness ($p<0.05$) of jones technique treating osteopathic dysfunctions with a resolution rate of 75% in experimental group against 11% for the control group. Tenderness of tender points has decreased significantly ($p<0.05$) of 65% in the experimental group against 5% in the control group. Mobility tests show a significate increase of flexion range of motion ($p<0.05$; +0.493cm between two groups in post-test and $p<0.05$; +0.527 for the before/after in experimental group). There is no significant difference in back pain, cardiac frequency or arterial pressure.

Conclusion: These results shown effectiveness of Jones' technique on mobility and presence of somatic dysfunctions. Those techniques had, however, no impacts on activity of vegetative nervous system.

Introduction

Jones' techniques (aka strain-counter strain) were described by Lawrence Hugh Jones (American osteopath) in 1981, based on clinical experimentations for more than 40 years, to treat his patients. Those techniques are based on three main principles which are: use of Tender Points (TP) for diagnosis, analgesic position for correction and its effect on neuromuscular spindles allowing to relax tense muscle and therefore free from kinetic restriction [1]. In 1991, R.L. Van Buskirk has developed another approach which presumes that those techniques may have an impact on pain perception and Vegetative Nervous System (VNS) for stimulate an organ (heart for example) through Sympathetic Nervous System (SNS).

He thus described a neurological model able to explain all the effects of Jones' techniques. Nonetheless, this model is merely theoretical and has never been proven clinically [2]. In this latter, the author explains that the somatic dysfunction is not local musculoskeletal disruption, but rather a disorder binding those last disruptions with other phenomenon such as pain, vegetative arousal and visceral dysfunction. Nociceptor's activation by a minor traumatism on a structure or an organ will cause pain whether it is perceived or not. At the medullary level, this activation will be able to stimulate, via synaptic loops, motor contingent of skeletal striated muscle leading to a muscular contraction shortening traumatized tissues and, thereby, be responsible of the lack of mobility experienced by the clinician (and sometimes the patient) on the somatic dysfunction level. Neural nociceptive loops can also stimulate sympathetic pool on the involved medullar level which can result very variated answers depending on the organs linked to the activated location (vasomotor, Broncho-dilatator, positive chronotropic, …) [2]. Associating musculoskeletal restriction, pain and effect on vegetative nervous system, this model better seems to explain the somatic dysfunction establishment in all its components [2].

In Jones' techniques, tissues are shortened in order to supress intern stress without stimulating nociceptors from the antagonist region. The time passed in correction position (90 seconds) allows breaking activation loops of pain, muscular contraction and sympathetic arousal. The slow and passive return in neutral position avoids stimulating nociceptors and thus, preventing re-offending. It will be recalled that this model remains theoretical and has never been the object of a clinical study.

Beside that theoretical description, there are some clinical studies of Jones' techniques in literature which have contradictory results. 2 studies tried to compare effects of Jones' techniques on masseters TP (to improve temporo-mandibular range of motion) to another technique and a control group (respectively with Chapman's trigger points and Mitchell's techniques). The first study outcomes are a significant improvement on temporo-mandibular range between techniques group and control group (no matter of the technique) without significant differences between the two techniques [3]. On the other hand, the 2nd study shows no significant differences between control group and Jones technique group [4]. In 2006, another study compared Jones technique on trapezius and a control group and found a significant improvement of the cervical range of mobility in agreement with the first study from Ibañez-Garcia [5]. In 2010, a 4th group has tried to study the effects of Jones' techniques on low back comparing variation of pain pressure threshold at the TP, electrical detection threshold and electrical pain threshold on a group treated by Jones' techniques, a second treated by a Sham technique (imitation-technique technically without effect). As a result, there are no significant differences between three groups [6]. Likewise, in 2013, a study compared effects of Jones' techniques and Sham technique on the improvement of cervical range of motion without seeing any differences between two groups [7].

We would notice that there are relatively few studies on Jones' techniques effect with conflicting results even if their protocols are very similar. This lack of results not allowing to understand how those techniques can act on the body, how well and for which use, brings into question the credit should be given to them treating patients in manual therapy. This being, from our literature analysis, we can point out that to proof Jones technique efficiency, authors have measured joints mobility and tenderness of tender points. To go even further and stick on osteopathic principles, we've decided to consider presence/absence of somatic dysfunction. Moreover, we've evaluated the subject feeling asking if he had a motion discomfort or any pain. Finally, we've chosen to evaluate impact on vegetative nervous system, to measure arterial blood pressure and instantaneous cardiac frequency. The choice of observed variables was guided by a study on high velocity osteopathic techniques [8].

The proposed study is suitable for testing clinically the theoretical neurological model and improves objectively osteopathic techniques efficiency which suffers their lack of credit at present. The aim of this study will be to assess part of this neurological model through an exploration of vegetative nervous response and estimate Jones technique efficiency on mobility (range of motion increase, reduce of the presence of dysfunction and experienced discomfort), pain (decline of spontaneous pain and TP tenderness) and sympathetic tonus (decrease of cardiac rhythm and arterial blood pressure).

Methods

Studied Population

60 subjects, 34 men and 26 women (31.17 years-old mean; ±9.88) signed the free and inform consent to enter this study. They had not any of those exclusion criteria: long-term disease, fracture, sprain, rheumatism, orthopaedic malformation, no surgery and no modification of dental, plantar or ophthalmic correction during the 3 previous months.

This study is a randomized simple-blind trial with an experimental group on which have been tested Jones' techniques and a control group which had a lying down rest period instead of the technique application.

There were no significant differences of age between two groups (F=1.76; NS). The sex repartition between the groups was completely equal (17 men for 13 women in each group).

Test

Technique

It was performed on experimental group subjects. Because it was the most recurrent dysfunction, only the correction of a posteriority to the right of the 4th thoracic level was performed. Moreover, it avoids bias of using multiple techniques depending on subjects. The subject is lengthened, head out of the table. Clinical practitioner set on the analgesic position of correction with a soft extension, right rotation and right side-bending by controlling tense on the corresponding TP.

Rest period

Subjects from the control group receive no treatment but a rest period with verbal exchange of 2 minutes 14 corresponding to time for achieving Jones' technique (30" for setting parameters, 90" for technique realisation and 15" for the passive return to neutral position).

Instantaneous cardiac frequency

Subjects had to wear the heart rate device (POLAR RX-800CX) in both two study groups before technique realisation or before the start of the rest period and remove it at the end. Instantaneous cardiac data have been identified and sequenced according to technique stages.

Pre/Post-Test

It is measurements and tests provided in both study groups before and after technique application or rest period (Figure 1).

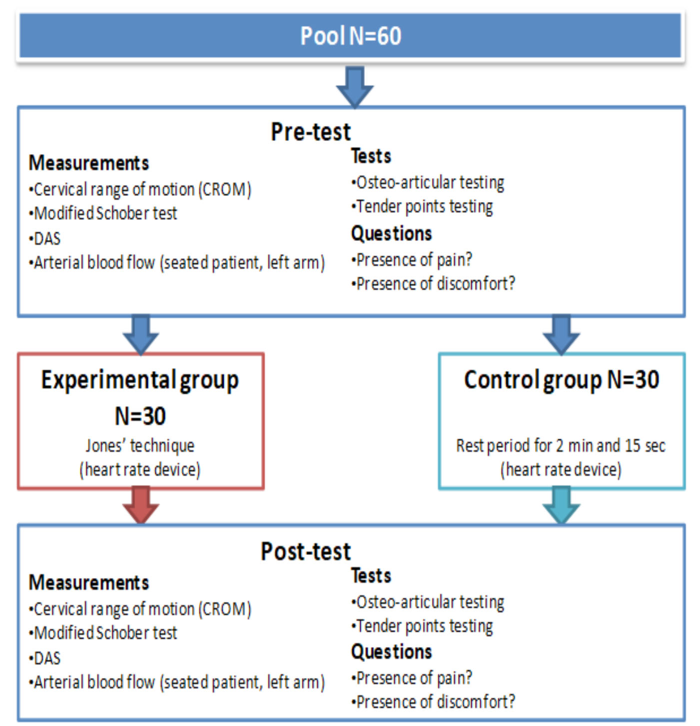

Figure 1: Experimental protocol.

Evaluation of joints mobility

According to Little John biomechanics, head rotation ran until the 4th thoracic level, thus, any high thoracic dysfunction (from T1 to T4) result in a diminution of the cervical rotation range of motion. Conversely, a high dorsal area tension release provides a wider cervical range of motion [9].

CROM

The Cervical Range of Motion (aka. CROM) measures the cervical amplitude of movement in all three planes. Reliability and repetitiveness of obtained measures on cervical area has been tested several times in literature. This tool is therefore essential for cervical movement measurement [10-12].

DAS

It is the Distance between Shoulder acromion and the contralateral posterior superior iliac spine (DAS) which allows investigating thoracic-lumbar rotation range of motion interesting because techniques were performed on high thoracic area.

Modified Schobert test

Its principle is to measure variation of spine distance from C7 to T4 between neutral position and maximum cervical flexion position. This test is described for measuring Jones' techniques effects on local flexion range of motion.

Osteopathic mobility tests

We only realised passive tests with a sitting subject. The osteopath mobilized his subject head to test the desired location (here C7 to T4) in all three planes of space. Then, the osteopath names the founded dysfunction by the biggest movement (for example, ERSR for a level in extension, right rotation and right side-bending either in restriction in flexion, left rotation or left side-bending).

Discomfort

We've asked participants if, yes or no, they felled any discomfort during head movements.

Pain Evaluation

Tender points

The TP to be recorded are those, anterior and posterior, from C7 to T4. Every time, the clinician note presence or absence of those tender points.

Experienced pain

We've asked participant if, yes or no, the felt spontaneously any pain in high thoracic area.

Blood pressure

The automatic measure of the blood pressure has been done with an electronic device (OMRON 705 CP). The outcome is expressed in millimetres of mercury (mmHg). It has been taken systematically in seated position.

Statistical Analysis

After comparison with standard normal distribution, quantitative variables were compared thanks to a variance analysis (ANOVA) on 2 groups (experimental and control) and 2 periods (pre-test and post-test). Quality variables were analysed using non parametric Chi-square test (Chi^2) and its derived forms based on expected values (Chi^2 if they were over 5, Yates' corrected Chi^2 between 3 and 5 and Fisher's exact p if they were under 3). On those variables (except sex), comparisons were made (1) between two groups in pre-test, (2) between two groups in post-test and (3) between variable evolution for the two groups (from pre-test to post-test).

Results

Presence of dysfunction

On pre-test (30 subjects in each group), there were no significant differences between two groups (Fisher; NS) as 29 had dysfunction in experimental group versus 28 in control group (Figure 2). On post-test, there were a significant difference (Chi² (1) =24.09; p<0.05) with 6 patient having dysfunction in experimental group against 25 in control group. So there were 23 normalisations in experimental group versus 3 in control which is a significant difference (Chi² (1) =27.02; p<0.05).

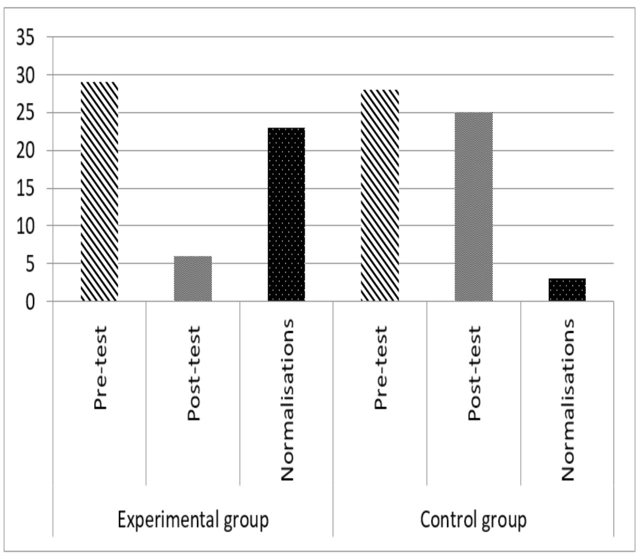

Figure 2: Number of dysfunction presenting patients evolution.

		Number of patients
Experimental group	Pre-test	29
	Post-test	6
	Normalizations	23
Control group	Pre-test	28
	Post-test	25
	Normalizations	3

Discomfort

During pre-test, there were no significant differences between two groups with 4 affected patients in experimental group and 7 in control group (Chi² (1) =1; NS) whereas in post-test it is significant because there were still 7 affected patients in control group but not anymore in experimental group (Chi² (1) =5.82; p<0.05). Discomfort has been reduced for 4 patients in control group to zero in experimental group, that difference is significant (Chi² (1) =27.02; p<0.05).

Flexion

Studying flexion range of motion with a modified Schobert test, ANOVA reveals a significant effect from group (F1.58=4.62; p<0.05) as experimental subjects had a bigger range of motion then control subjects (+0.32cm; ±0.1). Reveals also a test significant effect (F1.58=37.92; p<0.05) which means that with no matter of the group, range of motion is bigger after the test than before (+0.36cm; ±0.06). Because interaction effect is significant too, we used a Newman's post-hoc comparison which precise that there are no significant differences on flexion range between two groups on pre-test (p=0.34) but there is on post-test (p<0.05). Moreover, there is no significant difference in control group between pre and post-test (p=0.07), whereas it is significantly improved in test group (p<0.05).

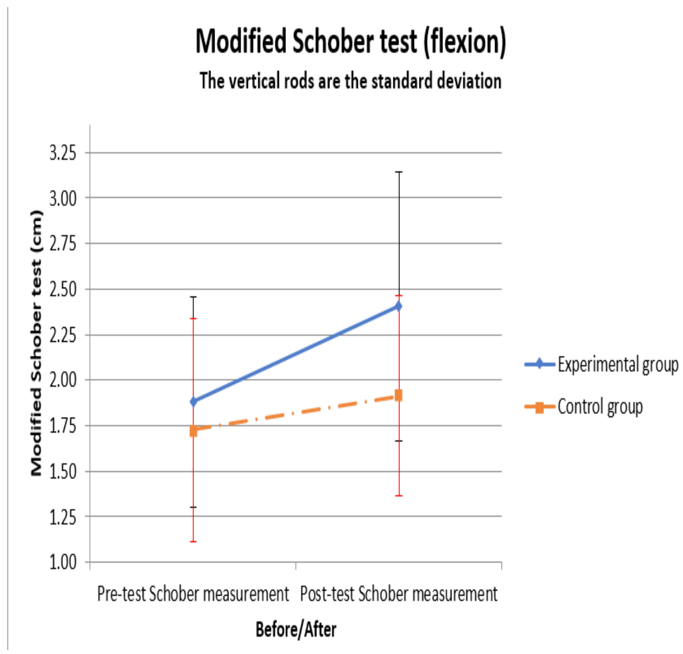

Figure 3: Flexion range of motion evolution.

	Pre-test Schober measurement	Post-test Schober measurement
Experimental group	1.8800	2.4067
Control group	1.7267	1.9133

Variable	Group=Test Statistiques Descriptives (Statistical results.sta)				
	N assets	Average	Average	Average	Average
Schober adapted before	30	1.8800	0.9000	3.1000	0.58037
Schober adapted after	30	2.4067	1.3000	4.0000	0.73856
Some CROM before	30	141.5333	90.0000	170.0000	17.29408
Some CROM After	30	153.5000	116.0000	172.0000	14.51931
Variable	Group= Controle Statistiques Descriptives (Statistical results.sta)				
	N assets	Average	Minimum	Maximum	Std Dev
Schober adapted before	30	1.7267	0.5000	3.2000	0.61191
Schober adapted after	30	1.9133	1.0000	3.3000	0.54881
Some CROM before	30	151.7333	118.0000	174.0000	14.08088
Some CROM After	30	154.1000	122.0000	175.0000	13.20750

Tender points

On pre-test 23 patients had positive tender points in experimental group against 21 in control group which is a non-significant difference (Chi² (1) =0.34; NS) whereas on post-test is a significant difference with 8 in control group and 20 in experimental group (Chi² (1) =9.64; $p<0.05$) which makes us 15 normalized tender points in experimental group against one in control group, there is a significant difference (Chi² (1) =17.34; $p<0.05$).

Head Rotation

For head rotation range of motion measured with CROM device, ANOVA reveals no significant group effect (F1.582.115; NS). On the other hand, there is a significant test effect (F1.58=55.79; $p<0.05$) with a bigger range after than before test (+7.17°; ±1.92). Because interaction effect is significant too, we used a Newman's post-hoc comparison which precise that the only significant difference is between pre-test in experimental group range of motion and the 3 other conditions ($p<0.01$), these last do not significantly differs there between (Figure 4).

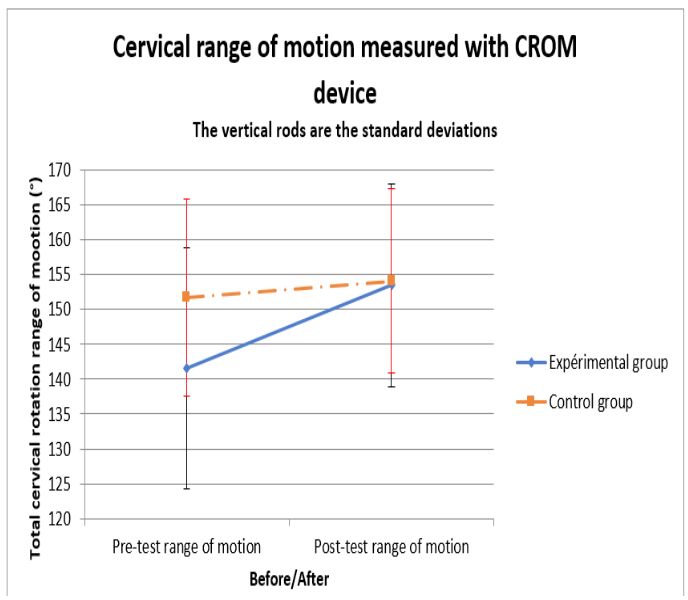

Figure 4: Head rotation range of motion evolution.

	Pre-test range of motion	Post-test range of motion
Experimental group	141.5333	153.5000
Control group	151.7333	154.1000

Variable	Group=Test Statistiques Descriptives (Statistical results.sta)				
	N assets	Average	Average	Average	Average
Schober adapted before	30	1.8800	0.9000	3.1000	0.58037
Schober adapted after	30	2.4067	1.3000	4.0000	0.73856
Some CROM before	30	141.5333	90.0000	170.0000	17.29408
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Some CROM before	30	151.7333	118.0000	174.0000	14.08088
Some CROM After	30	154.1000	122.0000	175.0000	13.20750

Other Results

Studying DAS reveals, no significant effect whether of the group, test or interaction. Cardiac frequency issues show a significant test effect only.

Type	Measurement	Effect	Degree of freedom	F	P
Mobility	DAS	Group	1	0,654	0,4219
		Pre/Post*	1	2,899	0,165
		Pre/Post* Group	1	3,662	0,0606
Heart Rate	Min	Group	1	0,953	0,3329
		Pre/Post/Post	2	17,539	0
		Pre/Post/Post* Group	2	6,9	0,5408
	Max	Group	1	1,089	0,3011
		Pre/Post/Post	2	23,082	0
		Pre/Post/Post* Group	2	0,82	0,4428
	Min/Max	Group	1	0,014	0,9059
		Pre/Post/Post	2	46,485	0
		Pre/Post/Post* Group	2	1,621	0,2022

Table 1: DAS and ICF ANOVAs.

ANOVA on systolic Arterial Blood Pressure (ABP) issues shows no significant group effect (F1.58= 2.44; NS), test effect (F1.58=2.68; NS) or interaction (F1.58=0.01; NS). ANOVA on diastolic ABP reveals no significant group effect (F1.58= 0.36; NS), test effect (F1.58=0.21; NS) or interaction (F1.58=0.19; NS). On pain, there is no differences between two groups on pre-test (Yates' Chi²=3.61: p=0.06); between two groups during post-test (Fisher's exact p; p=0.75) or on pain decrease between study groups (Fisher's exact p; p=0.25).

Discussion

As there were no significant differences between the study groups during pre-test, on age, sex, discomfort, experienced pain, dysfunction or TP issues, they are comparable.

On joints mobility, we can observe a significant difference on flexion range (measured by the modified Schober test) and head rotation range (measured with the CROM device) between pre and post-test with a significant gain in experimental group. However, we did not obtain any significant effect of Jones' techniques on the thoracic rotation range of motion (measured by the DAS). Presence of dysfunction and head rotation discomfort has significantly decreased in the experimental group during the post-test. With these elements, we may conclude that Jones' techniques serve to increase cervical rotation range of motion, normalize osteo-articular dysfunctions and decrease on subjects, presence of discomfort during cervical rotation. Those conclusions are in opposition with [7] study which did not find improvement on cervical range of motion measured with CROM device after a Jones' technique, but they comfort [3] study. Nonetheless, these conclusions are confounded by the difference during pre-test between the study groups, so we cannot predict for certain the technique effects with two comparable groups (but no-randomized) on pre-test.

On the pain issues, we found a significant decrease of TP presence in experimental group after execution of Jones' technique. It allows us to advance that Jones' techniques are efficient on TP treatment. For the record, those last are the mark of inappropriate muscular tensions which maintain dysfunctions [1]. This comfort previous conclusion that Jones' techniques are efficient to treat dysfunctions. Moreover, they comfort those from [3-5] studies on TP normalisation. If they are in conflict with those of [6] study, it might be explained by the small number of subjects in this study (N=28 divided in three groups). On experienced pain presence, Jones' technique seems having no effects. So they do not permit a significant and immediate decrease of pain. The patient welfare is just enhanced on discomfort felt during head rotation. It is important to note that out of evaluation pain questionnaire (Mc Gill, total pain relief …); pain evaluation by clinical measurement is rare. Some authors have made a literature review to evaluation effect of pain on cognitive process [13]. They explain that, in presence of pain, we find a decrease of memory, attention, decision-making and executive tasks performance proportionate to pain intensity.

Instantaneous Cardiac Frequency (ICF) and ABP are the two vegetative issues selected in this study to point out a potential effect of Jones' techniques on this nervous system activity. However, no significant variation on ICF before, during or after the technique was observed between experimental and control groups. On ABP, techniques had no significant affect. The only significant variations of the vegetative nervous system activity on ICF were between the different test periods: set parameters on, technique realisation and passive return to neutral position. As those differences were observed in both study groups, we may award this effect to the dorsal decubitus prolonged position. We can therefore conclude that Jones' technique don't have any influence on VNS (in a local or global manner). If we cannot disprove Van Buskirk's model, we can prove that, in this study, Jones' technique cannot be used to answer a somato-visceral problem.

We can also presume that the data gathering process was not optimized to have all the information according to the preferential channel concept. According to [14] it "corresponds to the preferential reaction from a subject along a determinate channel" [15]. Its presence has been determined by a study on 33 subjects among 6 vegetative response channels (cutaneous potential and resistance, superficial blood flow, dermal temperature, ICF and instantaneous respiratory frequency). They showed that for low stress stimulation, subjects react with the preferential channel. But with a stronger stimulus, previously non-used channels are also recruited [15]. Thus we can presume that, unlike others studies where there is an increase on VNS activity [8-19], the vegetative stimulation of this study was not strong enough to recruit all the channels and, and thus, those we chose to observe in this study despite direct myofascial release (as prove mobility measurements and TP and dysfunction normalisation).

This study shows experimentally the beneficial effect of Jones' techniques on muscular tensions guarding dysfunction as they are effective to normalize dysfunction, release TP and improve mobility. Those effects are experienced by both clinician and subject (on head rotation discomfort). Thus we can say that Jones' technique have a place in osteopath and more widely manual therapist therapeutics as a soft technique.

To pursue this work, it would be interesting to include another group where Jones' technique would have been done with wrong parameters without any known effect (Sham group) as we seen in literature (trying to avoid the subdivision group problem) [6-9]. The Sham group is interesting to proof that Jones' techniques work only if they are done according to the parameters that Jones described. Thus, in order to treat a right posterior TP (as in this study), after the normal parameters set on, clinician modify them causing a raise in TP tension and an incorrect position of correction. Then, as in Jones' technique, he maintains the position during 90 seconds before a slow and passive return in neutral position. It is therefore a placebo Jones' technique. Finally, compare with the same protocol different osteopathic technique will be interesting in order to measure their different effects on the same studied variables.

Those aspects provide several suggestions for further researches that are worthy to evaluate with objectivity osteopathic techniques efficiency. Thus, adding new quantitative variables, more objective, might complete information that the patient gave about his feelings. There are too few researches lead on osteopathic technique efficiency while they improve our knowledge of their effects on body in a holistic vision and justify their use to enhance patients comfort and well-being. This study should be extended to complete this knowledge and demonstrate even more osteopathy effects.

Conclusion

With this study, we can conclude that Jones' techniques have a benefic effect on mobility experienced by both the subject (discomfort), the clinician (presence of dysfunction) and measured (flexion and rotation). They can also decrease pain on TP which are a mark of somatic dysfunction. On the other hand, we did not find any significant effect of those techniques on vegetative nervous system.

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