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OUTCOMES OF CHIROPRACTIC DISTRACTION SPINAL MANIPULATION ON POST-SURGICAL CONTINUED LOW BACK AND RADICULAR PAIN PATIENTS: A RETROSPECTIVE CASE SERIES STUDY

James M. Cox, DC, DACBR, FACO(H), FICC, HonDLitt

Originally presented on November 3, 2016 at

9th Interdisciplinary World Congress
on Low Back and Pelvic Girdle Pain

PROGRESS IN EVIDENCE BASED DIAGNOSIS AND TREATMENT

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- ▶ Gudavalli MR, Olding K, Joachim G, Cox JM. Chiropractic Distraction Spinal Manipulation on Postsurgical Continued Low Back and Radicular Pain Patients: A Retrospective Case Series. *Journal of Chiropractic Medicine* , Volume 15 , Issue 2 , 121 – 128
 - ▶ Cox J.M.
 - ▶ Post Graduate, National University of Health Sciences, Lombard, IL, USA;
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 - ▶ Gudavalli, M.R.
 - ▶ Palmer Center for Chiropractic Research, Palmer College of Chiropractic, Davenport, IA, USA



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JANCUSKA JM, HUTZLER L, PROTOPSALTIS TS, BENDO JA, BOSCO J. UTILIZATION OF LUMBAR SPINAL FUSION IN NEW YORK STATE: TRENDS AND DISPARITIES. **SPINE**: 1 OCTOBER 2016 - VOLUME 41 - ISSUE 19 - P 1508–1514, DOI: 10.1097/BRS.0000000000001567

- ▶ Over the last 30 years, studies have indicated increasing rates of spinal fusion procedures performed each year in the United States.
- ▶ The number of fusions per year increased 55% from 2005 to 2014.



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KRIEG SM, MEYER B. [OPERATIVE OPTIONS FOR FAILED BACK SURGERY SYNDROME].
ORTHOPAED. 2016 AUG 19.

- ▶ NEW NAME FOR FBSS OR PSCP IN GERMANY – “**POST-NUCLEOTOMY SYNDROME**” - INCLUDES ALL EXISTING SEQUELAE AFTER SURGICAL NUCLEOTOMY FOR THE RESECTION OF A LUMBAR DISC HERNIATION, SUCH AS AXIAL LUMBAR BACK PAIN AND PERSISTING RADICULOPATHY.



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WHY CHIROPRACTIC MANIPULATION FOR POST SURGICAL CONTINUED PAIN PATIENT?

- ▶ Patients undergoing spinal surgery for lumbar disc herniation and/or spinal stenosis, with and without spinal fusion, report significant occurrence of post-surgical continued pain (PSCP). Chronic spinal pain, high reoperation rates, patient dissatisfaction, biopsychosocial issues, financial burden, and increasing surgical incidence cause patients to seek alternative care for PSCP.



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TRONNIER V(1). [SCS AS A TREATMENT OPTION FOR FAILED BACK SURGERY SYNDROME].
ORTHOPADE. 2016 AUG 16.

- ▶ UNFORTUNATELY, 10-40 % OF PATIENTS STILL EXPERIENCE PAIN AFTER SPINAL SURGERY.



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CLANCY C, QUINN A, WILSON F. THE AETIOLOGIES OF FAILED BACK SURGERY SYNDROME: A SYSTEMATIC REVIEW. **J BACK MUSCULOSKELET REHABIL**. 2016 SEP 23.

- ▶ 4 TO 50% OF LUMBAR SPINE SURGERY PATIENTS WILL DEVELOP FAILED BACK SURGERY SYNDROME (FBSS). REPEATED SURGERIES LEAD TO ESCALATING COSTS AND SUBSEQUENT DECREASES IN SUCCESS RATE.
- ▶ SIX STUDIES OF 663 PATIENTS SHOWED 22 CAUSES OF FBSS. THE CAUSES OF FBSS CAN BE ATTRIBUTED TO PATHO-ANATOMICAL, PERIPHERAL PAIN GENERATORS, PHYSICAL/MECHANICAL, NEUROPHYSIOLOGICAL, SURGICAL AND 'OTHER' AETIOLOGIES.



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ITZ C, HUYGEN F, KLEEF MV. A PROPOSAL FOR THE ORGANIZATION OF THE REFERRAL OF PATIENTS WITH CHRONIC NON-SPECIFIC LOW BACK PAIN. **CURR MED RES OPIN.** 2016 AUG 6;1-20.

► **RECENTLY STUDIES DEMONSTRATED THAT UP TO 65% OF PATIENTS EVOLVE TO CHRONIC PAIN AS OPPOSED TO THE PREVIOUSLY ACCEPTED 8%.**

- This paper recommends a *spine physician assistant* who works under the supervision of the General Practitioner to establish the sub-diagnosis, the risk factors for chronicity and to explain the proposed management plan to the patient. It frustrates me to see the chiropractic profession poised and able to take on this LBP problem, and it is being passed on to a Physician Assistant. *When will our profession awaken??*



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WHAT IS LEFT TO DO?

- ▶ All branches of medicine do their best.
- ▶ The final algorithm for decision making and treatment has not evolved – pre surgical and post surgical.
- ▶ Benefits of spinal manipulation, exercise, nutrition, acupuncture, cognitive training, psychosocial training are published.
- ▶ Chiropractic spinal manipulation is addressed in this presentation to gain understanding and future study.



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MR GUDAVALLI, K OLDING, G JOACHIM, JM COX: CHIROPRACTIC DISTRACTION SPINAL MANIPULATION ON POSTSURGICAL CONTINUED LOW BACK AND RADICULAR PAIN PATIENTS: A RETROSPECTIVE CASE SERIES. **JOURNAL OF CHIROPRACTIC MEDICINE** JUNE, 2016; 15 | NUMBER 2:121-128

- Purpose/Aim: PSCP patients seek chiropractic spinal manipulation; however, the frequency and outcomes of chiropractic care in this population are not sufficiently documented. This retrospective study reports on the utilization and clinical outcomes of pain for PSCP patients receiving specialized chiropractic flexion distraction (F/D) spinal manipulation.



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MATERIALS AND METHODS

- ▶ 15 chiropractors in North America collected data from 69 PSCP patients who sought care for continued or recurrent spine and/or lower extremity pain following spine surgery.
- ▶ The patient treatment period was from February 2012 through July 2012.
- ▶ Specific F/D spinal manipulation, utilized by 64% of chiropractors in the United States, was administered.
- ▶ VAS 0-100 mm pain scale reported pain improvement scores at the end of an initial 3 month active care period and a 24 month follow up period.
- ▶ The number of treatments and days of care were recorded. Additional care received during the 24 month post-active care period was also documented.
- ▶ Additionally, patient demographics, time period of pain recurrence following surgery, factors causing post-surgical pain recurrence, pre-surgical diagnosis, type of spine surgery, and the patient's pain relief following surgery were documented.



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TABLE I
DETAILS ON PRIOR SURGERY BEFORE COMING TO CHIROPRACTIC CONSULTATION

MONTHS SINCE LAST LUMBAR SPINE SURGERY	
Less than 1 month	0
1-3	3
3-6	0
6-9	6
9-12	3
12-18	2
12-24	4
More than 2 years	50
Patient did not answer	1

NUMBER OF LUMBAR SPINE SURGERIES	NUMBER OF PATIENTS WHO HAD LUMBAR SPINE SURGERIES
1	55
2	11
3	2
4	0
5	1



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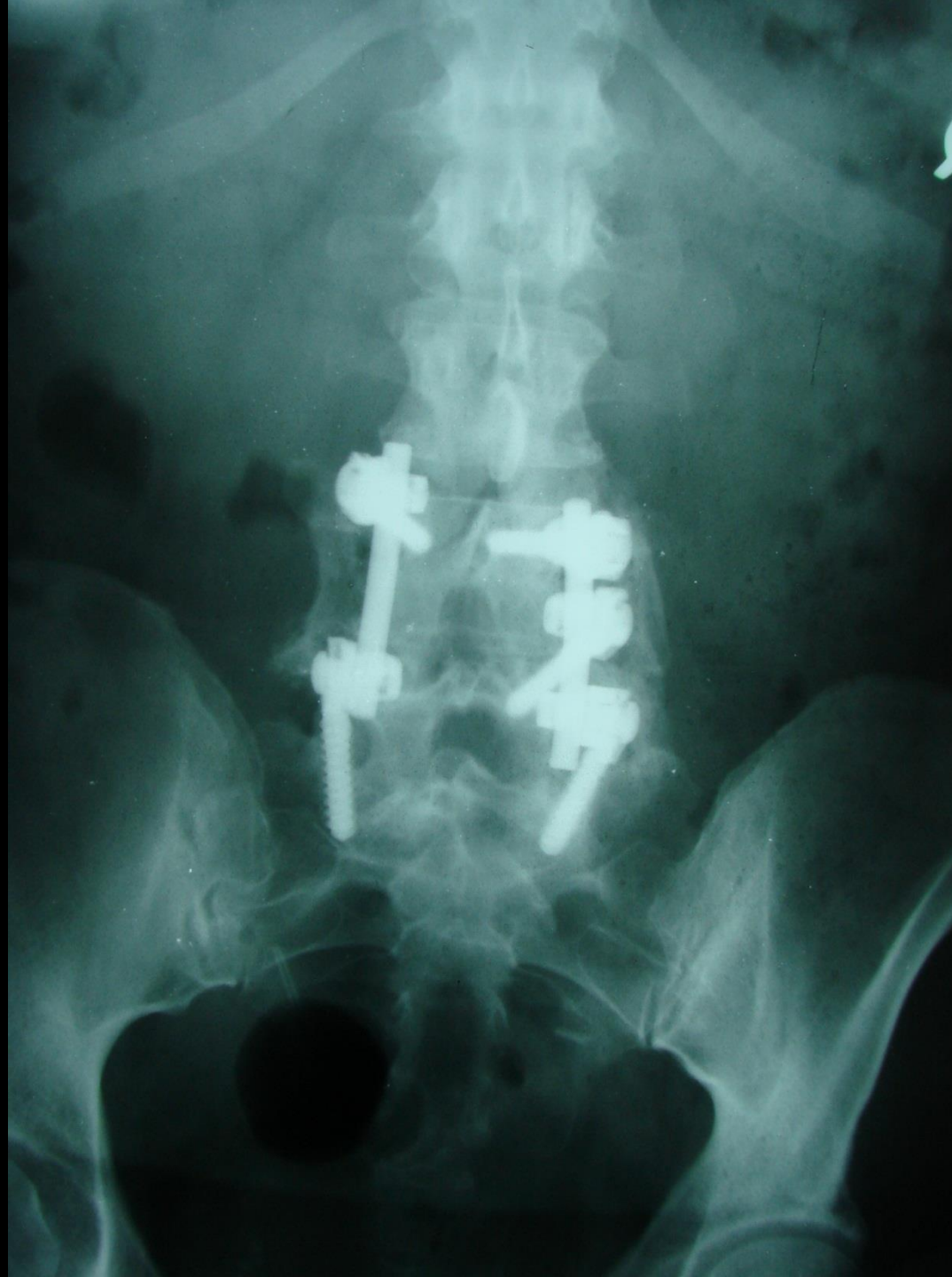


TABLE 3A

DETAILS ON THE SURGERY OF
THE 69 PATIENTS
(LUMBAR SURGERY WITH FUSION)¹

¹: One patient did not answer. Two patients had fusion surgery as well as non-fusion surgery. (One of them had L3-L4 decompression laminectomy with bolt and rod fusion and 3 level decompression laminectomy without fusion; the second had two levels of metal cushions/hardware at L4-L5.)

FUSION LUMBAR SURGERY (26 PATIENTS)	
NUMBER OF LEVELS FUSED	NUMBER OF PATIENTS
1	6
2	8
3	2
4	1
5	1
PATIENT DID NOT ANSWER	8
SPINAL SEGMENT FUSED	NUMBER OF PATIENTS
L2-L3	1
L3-L4	1
L4-L5	10
L5-S1	1
L1-S1	1
L4-S1	3
T10-L3	1
PATIENT DID NOT ANSWER	8
TYPE OF SURGERY PERFORMED	NUMBER OF PATIENTS
Decompression laminectomy with fusion with screw and rod	10
Decompression laminectomy with bone fusion	6
Intertransverse process fusion	0
Other (cage fusion, spondylolisthesis bolt fusion)	3
PATIENT DID NOT ANSWER	7





TABLE 3B
DETAILS ON THE NON-FUSION SURGERY PATIENTS

WITHOUT FUSION LUMBAR SURGERY (40 PATIENTS)	
NUMBER OF LEVELS OF SURGERY	NUMBER OF PATIENTS
1	18
2	14
3	3
4	1
5	3
PATIENT DID NOT ANSWER	1
TYPE OF SURGERY PERFORMED	NUMBER OF PATIENTS
MICRODISCECTOMY	15
DECOMPRESSION LAMINECTOMY WITHOUT FUSION	19
DISC REPLACEMENT	0
MICRODISCECTOMY AND DECOMPRESSION LAMINECTOMY WITHOUT FUSION	1
OTHER	5

TABLE 4
DESCRIPTION OF DIAGNOSIS THAT REQUIRED SURGERY

PRIMARY PRE-SURGICAL DIAGNOSIS	
DIAGNOSIS	NUMBER OF PATIENTS
Lumbar herniation	39
Spinal stenosis	11
Spondylolisthesis	2
Tumor	0
Scoliosis	0
Fracture	1
Discogenic back and leg pain	5
Lumbar herniation and spinal stenosis	1
Spinal stenosis and spondylolisthesis	1
Spinal stenosis and scoliosis	1
Scoliosis and DDD	1
Discogenic back and leg pain and scar tissue	1
Others (spondylosis with neuroforaminal narrowing and radiculopathy, cauda equina syndrome, right L4 synovial cyst, left L5 synovial cyst)	4
N/A	2



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RESULTS:

- **At the end of active care, 54 (81%) of patients report greater than 50% pain relief** and 13 (19%) less than 50% pain relief. (mean active care: 49 days, average 11 treatments)
- **At 24 months following active treatment,** 56 patients returned the survey. **46 (82%) patients report pain relief of greater than 50%,** and 10 (18%) patients report 50% or less relief.
- **The mean percent of relief at the end of active care was 71.6** (Standard Deviation (SD): 23.2), and **at 24 months was 70** (SD:25).



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RESULTS:

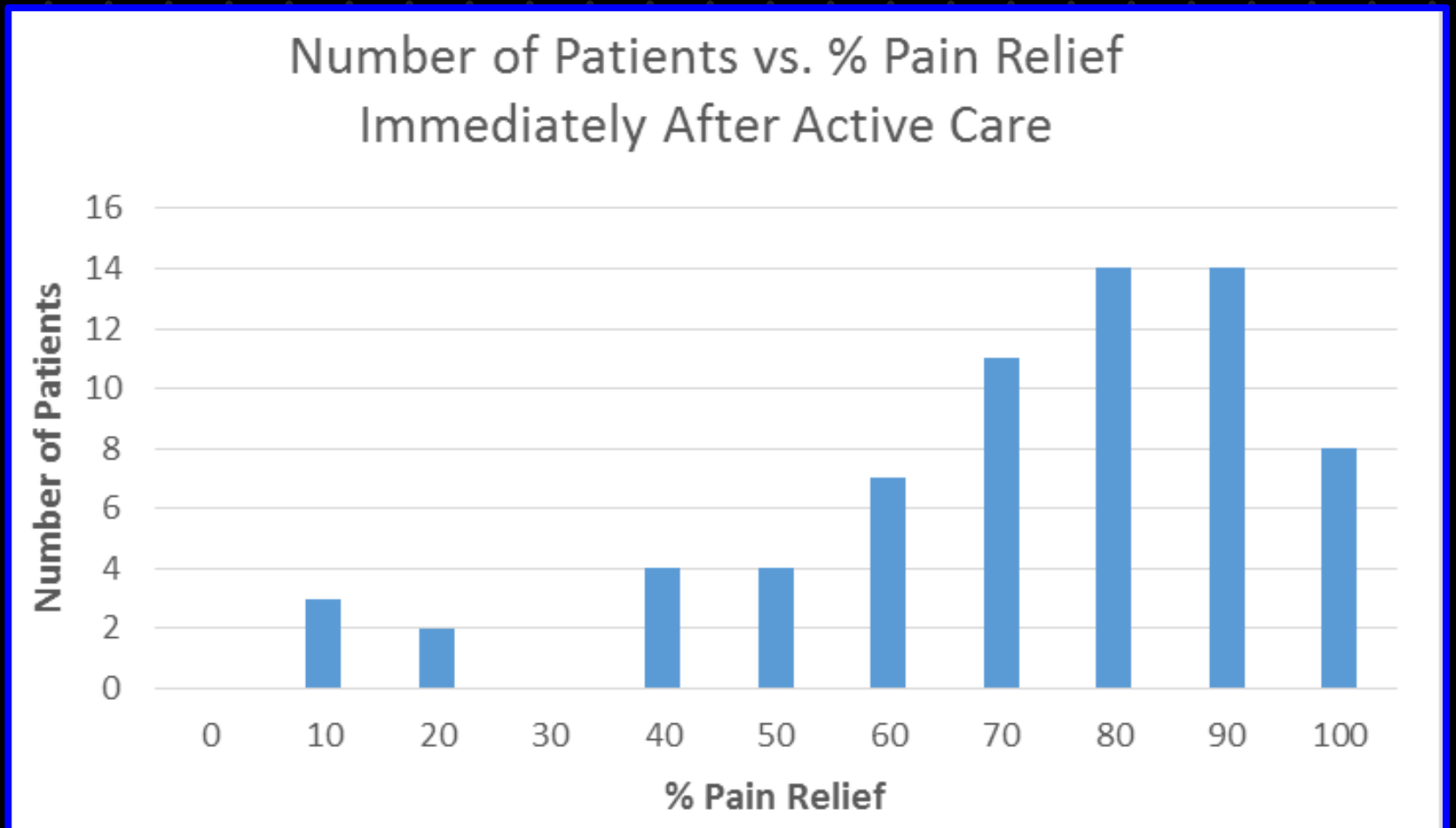
► Further at 24 months,

- 24 patients (43%) had not sought further care
- 32 patients required further treatment consisting of
 - chiropractic manipulation for 17 (53%),
 - physical therapy, exercise, injections, and medication for 9 (28%), and
 - additional surgery for 5 (16%).



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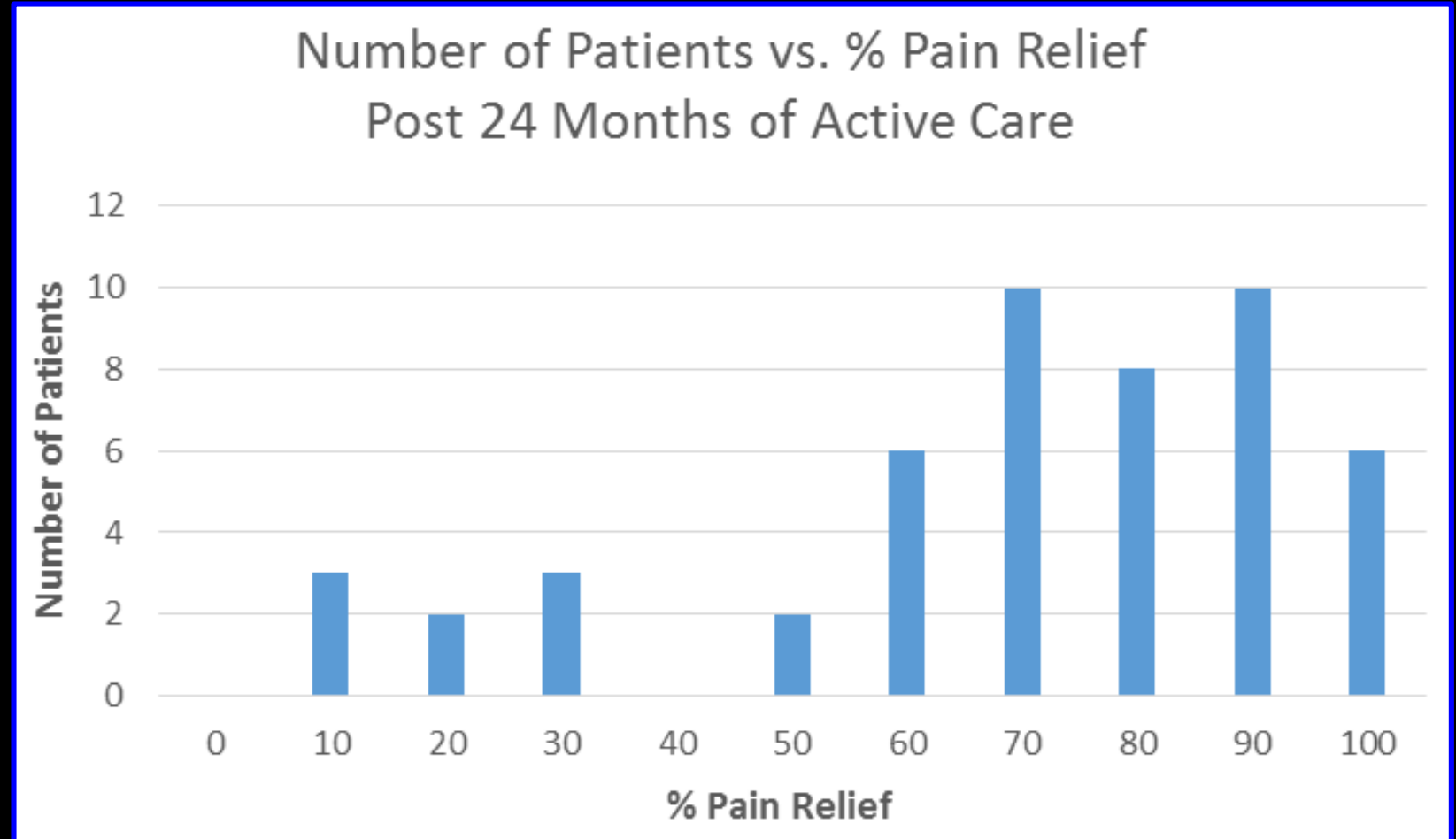
TABLE 5
ACTIVE CARE CLINICAL OUTCOME OF PATIENTS RECEIVING CTFD SPINAL
MANIPULATION



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TABLE 6

TWENTY FOUR MONTH CLINICAL OUTCOME OF PATIENTS RECEIVING CTFD



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CONCLUSION

- ▶ **Greater than 50% pain relief following chiropractic distraction spinal manipulation was seen in 81% of PSCP patients receiving a mean of 11 treatment visits over a 49 day period of active care.** Further systematic and randomized clinical studies are required to determine the benefits of spinal manipulation for post-surgical continued pain patients.



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GUDAVALLI MR, CAMBRON JA, MCGREGOR M, JEDLICKA J, KEENUM M, GHANAYEM AJ, PATWARDHAN AG. A RANDOMIZED CLINICAL TRIAL AND SUBGROUP ANALYSIS TO COMPARE FLEXION-DISTRACTION WITH ACTIVE EXERCISE FOR CHRONIC LOW BACK PAIN. *EUR SPINE J* 2006;15:1070-82

► The biomechanical changes in the spine when CTFD (Cox Technic Flexion Distraction) spinal manipulation is applied are documented as follows: [33]

1. Decreased intradiscal pressure
2. Intervertebral disc foraminal area increase
3. Increased intervertebral disc space height
4. Physiological range of motion of the facet joint

► This study is a collaborative NIH study with Loyola Stritch School of Medicine, Hines VA Hospital, Palmer College of Chiropractic, and National University of Health Sciences.





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STUDIES OF CHIROPRACTIC SPINAL MANIPULATION FOR POST SURGICAL SPINES

- ▶ Aspegren DD, Burt AL. A study of postspinal surgery cases in chiropractic offices. *Journal of Manipulative and Physiological Therapeutics* 1994;17:88-92. 68 Of 1939 PSCP (3.75%) went to a chiropractor for help. 70% of surgical spines c/o spine pain 4-17 years later.
- ▶ O'Shaughnessy J, Drolet M, Roy JF, Descarreaux M. Chiropractic management of patient's post-disc arthroplasty: eight case reports. *Chiropractic & Osteopathy* 2010;18:7-8 PSCP patients treated with positive results
- ▶ Morningstar MW, Strauchman MN. Manipulation under anesthesia for patients with failed back surgery: retrospective report of 3 cases with 1-year follow-up. *Journal Chiropractic Medicine* 2012;11:30-5 positive results with chiropractic manipulation
- ▶ McMorland G, Suter E, Casha S, du Plessis SJ, Hurlbert RJ. Manipulation or microdisectomy for sciatica? A prospective randomized clinical study. *J Manipulative Physiol Ther* 2010;33:576-84 positive results with chiropractic manipulation
- ▶ Estadt GM. Chiropractic/Rehabilitative management of post-surgical disc herniation: a retrospective case report. *J Chiropr Med* 2004;3:108-15. positive result
- ▶ Cox JM. Spinal adjusting of failed low back surgery. In: *Chiropractic Orthopedics Conference Proceedings*. Annual symposium on Investigation of Failed Low Back Surgery; 2009 May 8-May 10; San Antonio, Texas. Published by the American College of Chiropractic Orthopedists and Southern California University of Health Sciences and Texas Council of Chiropractic Orthopedists. American College of Chiropractic Orthopedists; 2009. p. 43-112.
- ▶ Coulis CM, Lisi AJ. Chiropractic management of postoperative spine pain: a report of 3 cases. *Journal of Chiropractic Medicine* 2013;12:168-75 This paper reports that 15-61% of spine surgery patients report persistent or recurring pain. 2.3-12% will see a chiropractor. 3 cases of PSCP patients were relieved with chiropractic manipulation
- ▶ Kruse RA, Cambron J. Chiropractic management of post-surgical lumbar spine pain: a retrospective study of 32 cases. *Journal of Manipulative and Physiological Therapeutics* 2011;34:408-12
- ▶ Cox JM, Feller J, Cox-Cid J. Distraction chiropractic adjusting: clinical application and outcomes of 1000 cases. *Top Clin Chiropr* 1996;3(3):45-59. 61-66 % of lumbar disc patients received good to excellent relief from Cox Technic.



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YANAMADALA VI, KIM Y, BUCHLAK QD, WRIGHT AK, BABINGTON J, FRIEDMAN A, MECKLENBURG RS, FARROKHI F, LEVEQUE JC, SETHI RK. MULTIDISCIPLINARY EVALUATION LEADS TO THE DECREASED UTILIZATION OF LUMBAR SPINE FUSION: AN OBSERVATIONAL COHORT PILOT STUDY. **SPINE** (PHILA PA 1976). 2017 JAN 6. DOI: 10.1097/BRS.0000000000002065. [EPUB AHEAD OF PRINT]

- ▶ MULTIDISCIPLINARY EVALUATION LEADS TO THE DECREASED UTILIZATION OF LUMBAR SPINE FUSION. A TOTAL OF 137 CONSECUTIVE PATIENTS WERE REVIEWED AT OUR MULTIDISCIPLINARY CONFERENCE DURING THE TEN MONTH PERIOD. OF THESE, 100 PATIENTS HAD BEEN RECOMMENDED FOR LUMBAR SPINE FUSION BY AN OUTSIDE SURGEON. CONSENSUS OPINION OF THE MULTIDISCIPLINARY CONFERENCE ADVOCATED FOR NON-OPERATIVE MANAGEMENT IN 58 PATIENTS (58%) WHO HAD BEEN PREVIOUSLY RECOMMENDED FOR SPINAL FUSION BY ANOTHER INSTITUTION ($\chi^2=26.6$; $P<0.01$). FURTHERMORE, THE SURGICAL TREATMENT PLAN WAS REVISED AS A PRODUCT OF THE CONFERENCE IN 28% (16) OF THE PATIENTS WHO ULTIMATELY UNDERWENT SURGERY ($\chi^2=43.6$; $P<0.01$). WE HAD ZERO 30-DAY COMPLICATIONS IN SURGICAL PATIENTS.
- ▶ CONCLUSIONS: ISOLATED SURGICAL DECISION MAKING MAY RESULT IN SUBOPTIMAL TREATMENT RECOMMENDATIONS. MULTIDISCIPLINARY CONFERENCES CAN REDUCE THE UTILIZATION OF LUMBAR SPINAL FUSION, POSSIBLY RESULTING IN MORE APPROPRIATE USE OF SURGICAL INTERVENTIONS WITH BETTER CANDIDATE SELECTION WHILE PROVIDING PATIENTS WITH MORE DIVERSE NON-OPERATIVE TREATMENT OPTIONS. WHILE LONG TERM PATIENT OUTCOMES REMAIN TO BE DETERMINED, SUCH MULTIDISCIPLINARY CARE WILL LIKELY BE ESSENTIAL TO IMPROVING THE QUALITY AND VALUE OF SPINE CARE.



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ALENTADO VJ1, LUBELSKI D2, STEINMETZ MP3, BENZEL EC2, MROZ TE2. CLEVELAND CLINIC STUDY. OPTIMAL DURATION OF CONSERVATIVE MANAGEMENT PRIOR TO SURGERY FOR CERVICAL AND LUMBAR RADICULOPATHY: A LITERATURE REVIEW. GLOBAL **SPINE J**. 2014 DEC;4(4):279-86. DOI: 10.1055/S-0034-1387807. EPUB 2014 AUG 28.

- ▶ SINCE THE 1970S, SPINE SURGEONS HAVE COMMONLY REQUIRED 6 WEEKS OF FAILED CONSERVATIVE TREATMENT PRIOR TO CONSIDERING SURGICAL INTERVENTION FOR VARIOUS SPINAL PATHOLOGIES. IT IS UNCLEAR, HOWEVER, IF THIS STANDARD HAS BEEN VALIDATED IN THE LITERATURE. THE AUTHORS REVIEW THE NATURAL HISTORY, OUTCOMES, AND COST-EFFECTIVENESS STUDIES RELATING TO THE CURRENT STANDARD OF 6 WEEKS OF NONOPERATIVE CARE PRIOR TO SURGERY FOR PATIENTS WITH SPINAL PATHOLOGIES. METHODS A SYSTEMATIC MEDLINE SEARCH FROM 1953 TO 2013 WAS PERFORMED TO IDENTIFY NATURAL HISTORY, OUTCOMES, AND COST-EFFECTIVENESS STUDIES RELATING TO THE OPTIMAL PERIOD OF CONSERVATIVE MANAGEMENT PRIOR TO SURGICAL INTERVENTION FOR BOTH CERVICAL AND LUMBAR RADICULOPATHY. DEMOGRAPHIC INFORMATION, OPERATIVE INDICATIONS, AND CLINICAL OUTCOMES ARE REVIEWED FOR EACH STUDY. RESULTS **A TOTAL OF 5,719 STUDIES WERE IDENTIFIED; OF THESE, 13 STUDIES WERE SELECTED FOR INCLUSION.** NATURAL HISTORY STUDIES DEMONSTRATED THAT 88% OF PATIENTS WITH CERVICAL RADICULOPATHY AND 70% OF PATIENTS WITH LUMBAR RADICULOPATHY SHOWED IMPROVEMENT WITHIN 4 WEEKS FOLLOWING ONSET OF SYMPTOMS. OUTCOMES AND COST-EFFECTIVENESS STUDIES SUPPORTED SURGICAL INTERVENTION WITHIN 8 WEEKS OF SYMPTOM ONSET FOR BOTH CERVICAL AND LUMBAR RADICULOPATHY. CONCLUSIONS **THERE ARE LIMITED STUDIES SUPPORTING ANY OPTIMAL DURATION OF CONSERVATIVE TREATMENT PRIOR TO SURGERY FOR CERVICAL AND LUMBAR RADICULOPATHY.** THEREFORE, EVIDENCE-BASED CONCLUSIONS CANNOT BE MADE. BASED ON THE AVAILABLE LITERATURE, WE SUGGEST THAT AN **OPTIMAL TIMING FOR SURGERY FOLLOWING CERVICAL RADICULOPATHY IS WITHIN 8 WEEKS OF ONSET OF SYMPTOMS. A SHORTER PERIOD OF 4 WEEKS MAY BE APPROPRIATE BASED ON NATURAL HISTORY STUDIES. ADDITIONALLY, WE FOUND THAT OPTIMAL TIMING FOR SURGERY FOLLOWING LUMBAR RADICULOPATHY IS BETWEEN 4 AND 8 WEEKS.** A PROSPECTIVE STUDY IS NEEDED TO EXPLICITLY IDENTIFY THE OPTIMAL DURATION OF CONSERVATIVE THERAPY PRIOR TO SURGERY SO THAT COSTS MAY BE REDUCED AND PATIENT OUTCOMES IMPROVED.



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- **An update of the Bone and Joint Decade Task Force on Neck Pain and Its Associated Disorders by the OPTIMA collaboration ----
MOBILIZATION, MANIPULATION, AND CLINICAL MASSAGE ARE EFFECTIVE INTERVENTIONS FOR THE MANAGEMENT OF NECK PAIN. IT ALSO SUGGESTS THAT ELECTROACUPUNCTURE, STRAIN-COUNTERSTRAIN, RELAXATION MASSAGE, AND SOME PASSIVE PHYSICAL MODALITIES (HEAT, COLD, DIATHERMY, HYDROTHERAPY, AND ULTRASOUND) ARE NOT EFFECTIVE AND SHOULD NOT BE USED TO MANAGE NECK PAIN.**



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FORCES DURING LOW BACK FLEXION DISTRACTION

M.R. Gudavalli

J.M. Cox

9th World Congress on Low Back and Pelvic Pain

November 4, 2016

Singapore

9th Interdisciplinary World Congress
on Low Back and Pelvic Girdle Pain

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Based on this published article:

Gudavalli MR, Cox JM:
Real-time force feedback
during flexion-distraction
procedure for low back pain:
A pilot study.

J of the Can Chiro Assoc 2014;
June 58(2):193-200

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J Can Chiropr Assoc. 2014 Jun;58(2):193-200.

Real-time force feedback during flexion-distraction procedure for low back pain: A pilot study.

Gudavalli MR¹, Cox JM².

Author information

Abstract in English, French

A form of chiropractic procedure known as Cox flexion-distraction is used by chiropractors to treat low back pain. Patient lies face down on a specially designed table having a stationery thoracic support and a moveable caudal support for the legs. The Doctor of Chiropractic (DC) holds a manual contact applying forces over the posterior lumbar spine and press down on the moving leg support to create traction effects in the lumbar spine. This paper reports on the development of real-time feedback on the applied forces during the application of the flexion-distraction procedure. In this pilot study we measured the forces applied by experienced DCs as well as novice DCs in using this procedure. After a brief training with real-time feedback novice DCs have improved on the magnitude of the applied forces. This real-time feedback technology is promising to do systematic studies in training DCs during the application of this procedure.

KEYWORDS: Cox; chiropractic; flexion-distraction; real-time; technique

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Real-time force feedback during flexion-distraction procedure for low back pain: A pilot study

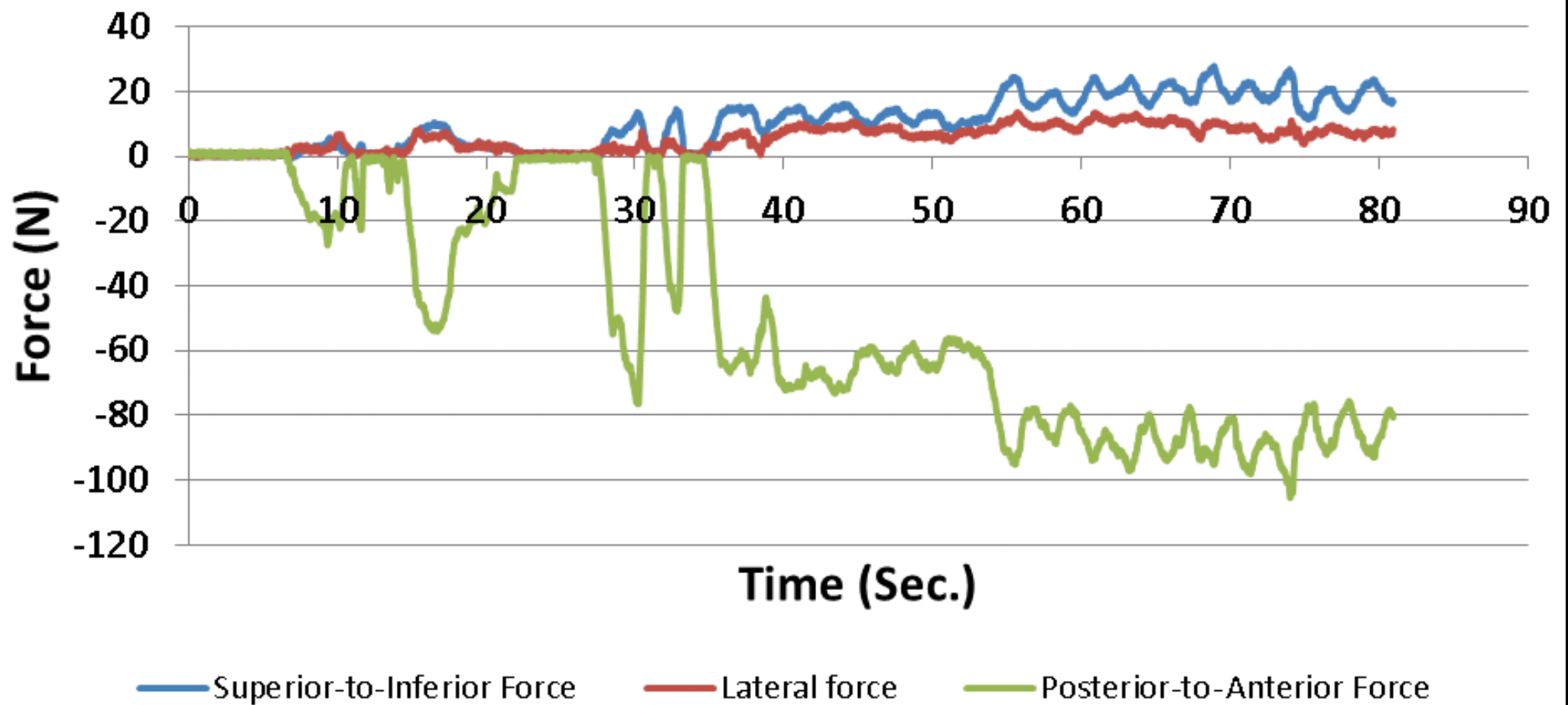
Maruti Ram Gudavalli, PhD*
James M. Cox, DC, DACBR**

A form of chiropractic procedure known as Cox flexion-distraction is used by chiropractors to treat low back pain. Patient lies face down on a specially designed table having a stationery thoracic support and a moveable caudal support for the legs. The Doctor of Chiropractic (DC) holds a manual contact applying

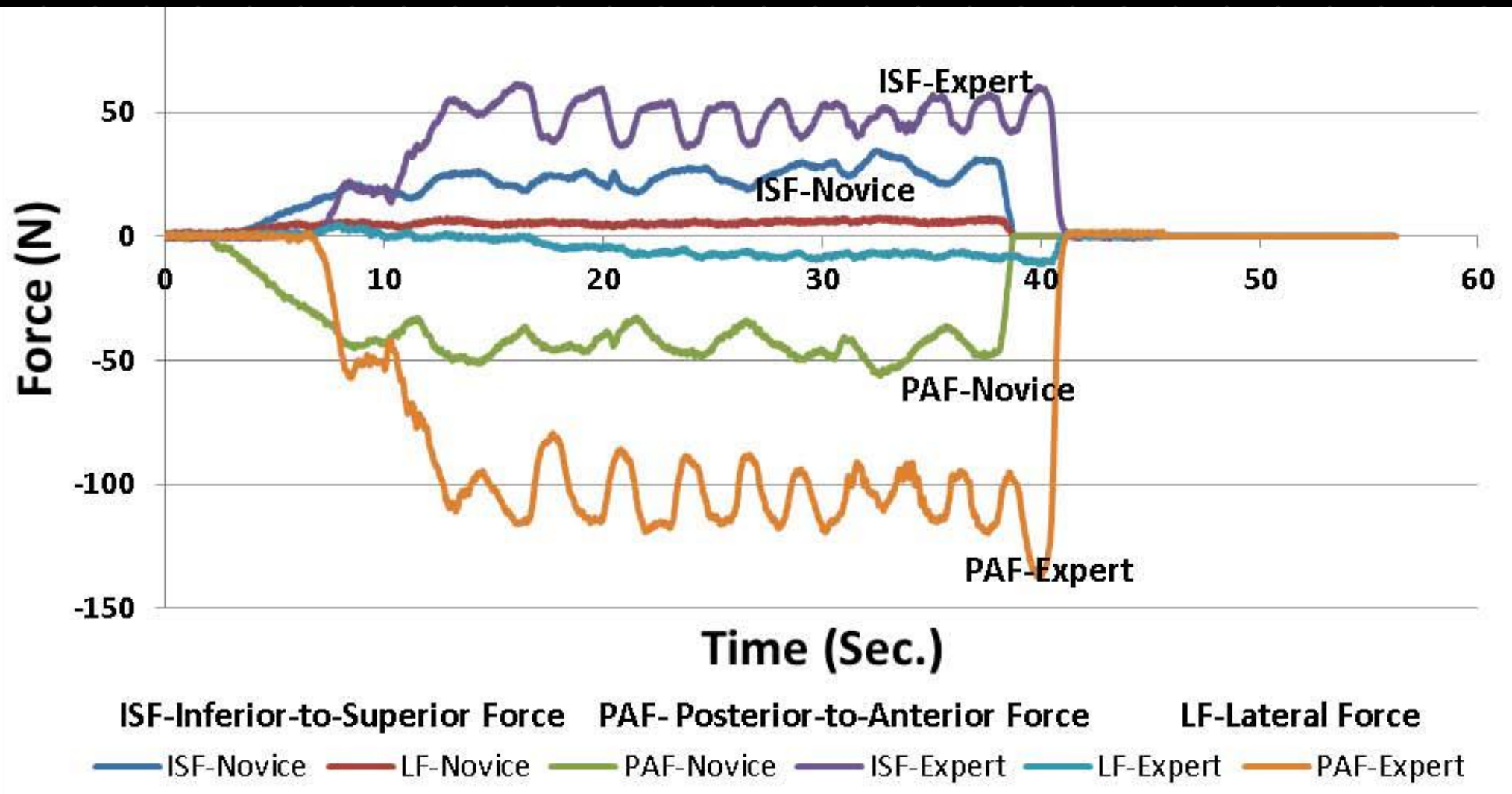
Une forme de procédure chiropratique connue sous le nom de flexion-distraction Cox est employée par les chiropraticiens dans le traitement de la lombalgie. Le patient se couche sur le ventre sur une table spécialement conçue, qui comporte un support thoracique stationnaire et un support caudal mobile



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Table 1.
*Descriptive values of Forces by experienced and novice
 Doctors of Chiropractic*

Variable	Novice DCs (N=5) Mean (SD)	Experienced DCs (N=5) Mean (SD)
Inferior-to-Superior Forces		
Pre-load (N)	19 (6)	44 (16)
Peak Force (N)	41 (12)	65 (10)
Posterior-to-Anterior Forces		
Pre-load (N)	46 (27)	95 (34)
Peak Force (N)	86 (45)	140 (43)

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Table 2.
*Descriptive comparison of forces of novice Doctors of
 Chiropractic before and after training*

Variable	Before Training (N=5) Mean (SD)	After Training (N=5) Mean (SD)
Inferior-to-Superior Forces		
Pre-load (N)	19 (6)	31 (12)
Peak Force (N)	41 (12)	52 (12)
Posterior-to-Anterior Forces		
Pre-load (N)	46 (27)	69 (30)
Peak Force (N)	86 (45)	102 (43)

N-Newtons



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LOW BACK F/D FORCES TAUGHT TO STUDENTS AT PALMER DAVENPORT

Presented at
ACCRAC 2016

By
R.M. Rowell
M.R. Gudavalli
S. Silverman



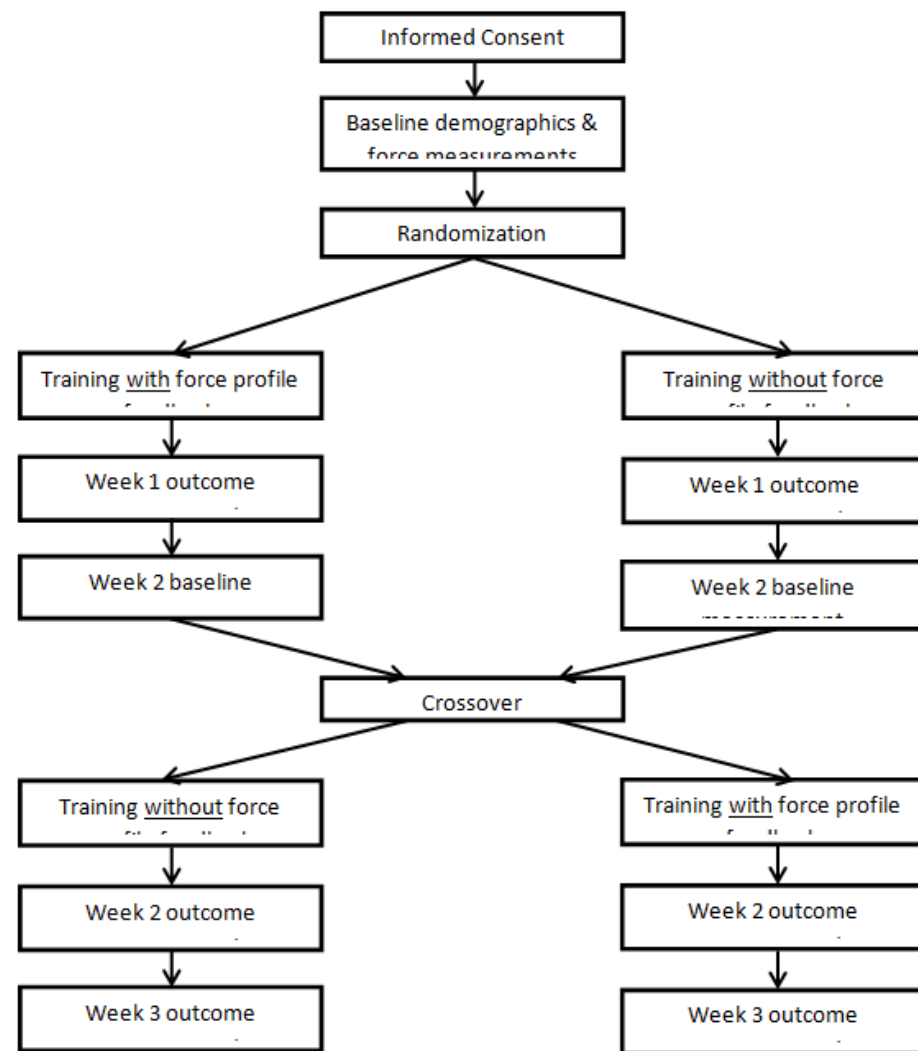
Weekend 1

Saturday

Sunday

Weekend 2

Saturday



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The effect of force feedback training on students learning Flexion-Distraction technique.

Robert M. Rowell, DC, MS*
M. Ram Gudavalli, PhD**
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Introduction

- Flexion-Distraction (F-D) technique is used by up to 64% of chiropractors.
- Most chiropractic colleges have courses in F-D.



Introduction

- Learning manual therapies such as F-D can be frustrating for students
- Snodgrass, et al, found that using real-time force measurement and providing students with feedback, helped them to learn cervical spine mobilization.*
- Triano, et al. have shown that practicing manipulation with real-time feedback helps students to learn to apply the appropriate forces.**

*Snodgrass SJ, Rivett DA, Robertson VJ, Stojanovski E. Real-time feedback improves accuracy of manually applied forces during cervical spine mobilisation. *Man Ther* 2010;15:19-25.
**Triano JJ, Scaringe J, Bougie J, Rogers C. Effects of visual feedback on manipulation performance and patient ratings. *J Manipulative Physiol Ther* 2006;29:378-85.
***Triano JJ, Descarreaux M, Dugas C. Biomechanics—review of approaches for performance training in spinal manipulation. *J Electromyogr Kinesiol* 2012;22:732-9.

Introduction

- Gudavalli demonstrated that novice chiropractors learned to apply forces more consistent with those applied by experienced chiropractors with real-time force feedback.*
- Forces used by experienced clinicians during F-D have been measured and documented.*

*Gudavalli MR, Cox JM. Real-time force feedback during flexion-distraction procedure for low back pain: A pilot study. *J Can Chiropr Assoc* 2014;58:193-200.

Purpose

- To compare students who were trained with and without force feedback.
 - Students attempt to match the forces of experienced clinicians
 - With and without force feedback

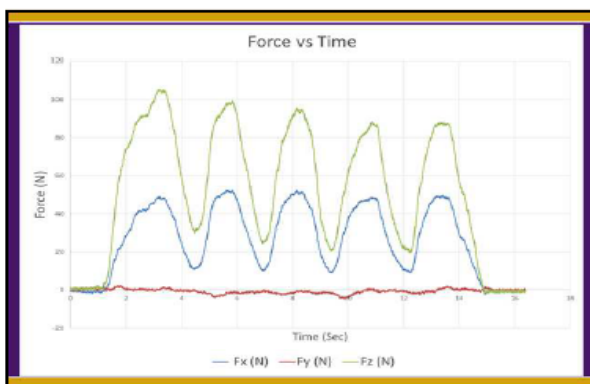
Methods

- Palmer F-D elective class
 - 2 weekends
 - 15 hours per weekend
- Student volunteers
 - Randomly assigned to 2 groups
- Group 1: Traditional classroom training plus force feedback training
- Group 2: Traditional classroom training
 - Traditional classroom training: lectures, demonstrations, and hands-on practice sessions.

Methods

- Baseline measurement on day 1
 - Both groups
- Training
 - Group 1: Training with force feedback
 - Group 2: Traditional training
- Follow up measurements of both groups at end of weekend 1
 - Measurement 2
- Follow up measurements 1 week later
 - Measurement 3
- Crossover of group 2 with measurement 4

Force Transducer



Results

Table 1: Baseline Participant Characteristics

N=31	Group 1	Group 2
Sex (F:M)	5:11	5:10
Age (Mean(SD))	25.5 (1.46)	26.1 (2.02)
Height (inches)	68.8 (4.2)	68.9 (2.93)
Weight (lbs)	171.4 (30.35)	190.5 (62.8)

Expert Forces

Variable	Experienced DCs (N=5) Mean (SD)
Inferior-to-Superior Forces	
Pre-load (N)	44 (16)
Peak Force (N)	65 (10)
Posterior-to-Anterior Forces	
Pre-load (N)	95 (34)
Peak Force (N)	140 (43)

N-Newtons

Gudavalli MR, Cox JM. Real-time force feedback during flexion-distraction procedure for low back pain: A pilot study. J Can Chiropr Assoc 2014;58:193-200.

Pre-load and Peak Force measurements by group

Measure	Group	Pre Fz	Peak Fz	Pre Fx	Peak Fx	Pre Fy	Peak Fy
1	1 (n=32)	2.7 (5.3)	63.0 (26.2)	5.2 (5.6)	13.5 (9.7)	-1.0 (3.7)	-9 (5.3)
	2 (n=30)	2.9 (5.6)	70.3 (25.8)	5.8 (7.5)	14.4 (11.4)	-2.7 (3.6)	-2.6 (5.6)
2	1 (n=30)	14.1 (9.4)	127.3 (23.7)	17.7 (10.7)	26.2 (11.9)	-3.8 (6.7)	-4.8 (7.2)
	2 (n=28)	5.3 (10.1)	76.2 (20.0)	8.3 (11.2)	16.1 (12.8)	-2.0 (3.6)	-2.4 (4.7)
3	1 (n=30)	17.7 (11.4)	127.5 (28.4)	22.0 (14.3)	35.1 (15.0)	-3.2 (5.3)	-3.3 (6.1)
	2 (n=28)	15.2 (12.3)	113.5 (25.1)	20.2 (14.3)	37.9 (17.6)	-9 (5.9)	-6 (7.3)
4	2 (n=28)	10.7 (16.1)	114.2 (21.2)	16.1 (17.5)	24.7 (21.5)	-2.7 (6.2)	-3.4 (7.0)

Forces reported as mean (SD) Newtons

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Forces reported as mean (SD) Newtons

Student opinions

- Students were also surveyed about their attitudes toward force feedback training.
- The majority of students rated the helpfulness of force feedback as either very helpful or somewhat helpful.

Conclusion

- Students training with force-feedback deliver forces closer to the desired level.
- They learn this faster than students not trained with force-feedback.
- Most students felt that force-feedback training was very helpful or somewhat helpful.
- Force feedback training could be useful for training students in other techniques.

Introduction

Background

- Case reports describe new conditions or treatments, unanticipated outcomes of treatment, and rare manifestations of conditions.
- They are often referred to as the lowest level of evidence due to their limited generalizability, difficulty to replicate, and variation in the quality of their reporting.
- Case reports can be reframed so they are thought of as the first line of evidence.

Purpose

- The purpose of this study is to assess the quality of case reports published on a technique website to identify possible recommendations for quality improvement.
- Many websites publish case reports that are not available in peer-reviewed journals.
- This may limit the audiences that will access the literature, the use of this literature, and the quality of the cases without a peer-review process.

Methods

- Case reports were selected from the Cox Technic website and included cervical spine cases published through 6/23/2016.
- Case reports also published in journals or other trade publications were excluded.
- Two reviewers independently assessed all eligible case reports using the CARE checklist.
- The CARE guidelines are endorsed by multiple medical journals and are aligned with the Equator Network.

Evaluation Instrument

2016 CARE Checklist¹

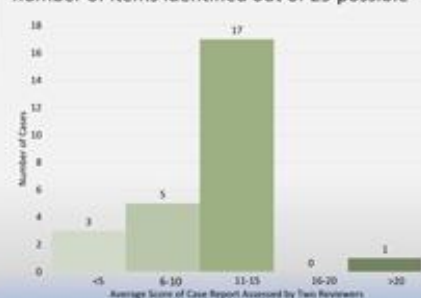
Item	Checklist item description	Yes/No
1	The study "case report" should be clearly identifiable as such	
2	The study "case report" should be clearly identifiable as such	
3	Background: What is the case report about? (Include the condition, the patient's history, and the intervention)	
4	Introduction: What is the case report about? (Include the condition, the patient's history, and the intervention)	
5	Physical Exam: What is the case report about? (Include the condition, the patient's history, and the intervention)	
6	Diagnosis: What is the case report about? (Include the condition, the patient's history, and the intervention)	
7	Interventions: What is the case report about? (Include the condition, the patient's history, and the intervention)	
8	Outcomes: What is the case report about? (Include the condition, the patient's history, and the intervention)	
9	Conclusions: What is the case report about? (Include the condition, the patient's history, and the intervention)	
10	Additional Information: What is the case report about? (Include the condition, the patient's history, and the intervention)	

Results

Flow diagram of case reports assessed



Case report assessment based on total number of items identified out of 29 possible



Checklist items most often present and absent

Items often present in case reports (>80% by both reviewers)	Items often absent in case reports (<5% by both reviewers)
<ul style="list-style-type: none"> Patient Information <ul style="list-style-type: none"> Demographics (Item 6a) Chief Complaint (Item 6b) Relevant History (Item 6c) Physical Exam (Item 7) Diagnostic Evaluation (Item 8a) Interventions <ul style="list-style-type: none"> Types (Item 9a) Concurrent (Item 9d) Clinical Assessment of Outcomes (Item 10a) 	<ul style="list-style-type: none"> Keywords (Item 2) Abstract Background (Item 3a) Case summary (Item 3b) Conclusion (Item 3c) Introduction with references (Item 4) Timeline (Item 5) Assessment Tables/Figures (Item 8c) Informed Consent (Item 13) Additional Information (Item 14)

- The quality of case reports varied greatly.
- Documentation of informed consent was not evident in any case report and should be an important future consideration.
- An introduction with references was only present in 1 case report, possibly highlighting a need for training in searching and using the literature.
- Diagnostic evaluation was present in all case reports, most often through the inclusion of imaging. This may not be the case for other body regions or techniques.

Conclusion

- Clinicians find value in case reports from sources other than peer-reviewed journals and give this information to patients.
- Technique websites frequently present case reports, and this is an important first step for sharing new information.
- Improving these case reports in accordance with CARE guidelines would increase the quality of the materials shared.
- Publishing in peer-reviewed journals will also increase the audience that accesses this information.

Limitations

- This study only looked at one topic for one technique which may limit generalizability.
- There was discretion in determining what qualified as meeting the CARE requirements and there was no weighting of scores based on depth or importance of each feature.
- Some authors submitted multiple reports, which may have influenced the mean score.
- There was no information on the level of experience as an author or as a clinician.

Next Steps

- Websites could provide more stringent author guidelines such as CARE, or could consider relabeling case reports as patient narratives.
- If most of the guidelines are met, websites could recommend publication of the case report in a peer-reviewed journal.
- Technique groups, practitioners, and researchers should collaborate to develop training materials to help improve quality of the case reports and to assist with potential publications.

References

- CARE figures and information can be found at <http://www.equator-network.org/reporting-guidelines/care/>.
- Cox Technic case reports can be found at <http://www.coxtechnic.com/downloads.aspx>.
- Gagnier JJ, Kienle G, Altman DG, Moher D, Sox H, Riley D; the CARE Group. The CARE Guidelines: Consensus-based Clinical Case Reporting Guideline Development. *J Med Case Rep.* 2013;7(1):223.
- Vandenbroucke, J.P., 2001. In Defense of Case Reports and Case Series. *Ann. Intern. Med.* 134, 330-334.

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