Neck, Shoulder, Arm Pain
Mechanism, Diagnosis, and Treatment
Fourth Edition
Neck, Shoulder, Arm Pain:
Mechanism, Diagnosis, and Treatment

4th edition

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- Case reports
- Clinical research literature pearls with commentary based on abstracts from the medical literature regarding spine care

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FOREWORD

The 4th edition of *Neck, Shoulder, and Arm Pain* is a great starting point to mastering the management of some of the most difficult cases any chiropractor will see in their practice. There is true joy in helping patients who have tried everything. Mastering the information in this text, along with the hands-on training available at the seminar, will give you the tools to handle the 25% of the cases which are 95% of the cost of back care in the United States. The number of post-surgical cases seeking help is escalating rapidly, and we have seen amazing results applying Dr. Cox’s work. I have studied with Dr. Cox for years, and I still learn from every encounter with him. I truly appreciate the sacrifices Dr. Cox has made for his beloved profession, and this book continues that legacy. This technique is so powerful when done correctly. Time and repetition is needed to master the technique. All of the time and effort needed to be comfortable with this technique will be repaid ten-fold with the satisfaction of helping patients who have not been helped anywhere else. Our future is as spine specialists, and Dr. Cox’s work is the cutting edge of treatment for spine problems.

Sincerely,

Kurt J. Olding D.C.
Cox® Certified
PREFACE FOR FOURTH EDITION

This edition contains the last ten years of meticulously collected research articles on the mechanism, diagnosis and treatment of neck, shoulder, and arm pain. Treating cervical spine pain and radiculopathy is overwhelming in its need for these procedures and this edition contains the detailed delivery of cervical spine Cox® Technic Flexion Distraction and Decompression spinal manipulation distraction procedures.

The older patient set over age 55-60 continues to increase, making common high velocity and rotatory spinal adjustments impossible in many patients. After reading the foreword, one can see why the combination of distraction with chiropractic Cox® distraction joint adjustment is the premier manipulative delivery and often the only form of spinal manipulation possible.

Chapters 1 to 4 are over 90% new material in the fourth edition. Chapters 5 to 7 update and detail the distraction biomechanics linked to Cox® flexion distraction and decompression spinal adjusting. The foreword again details this fact. Chapter 8 puts this fourth edition into its practical mode by presenting cervical and thoracic spine conditions treated with my work. This chapter “brings it all together” and is a textbook in itself.

- James M. Cox, DC, DACBR
ACKNOWLEDGEMENTS

Two women deserve monumental credit for this book and the cervical spine treatment it contains. First is my wife, Judi, who developed right arm C6 radiculopathy and insisted, against my desire, that I develop treatment for the neck like I had for the lumbar, lumbosacral and thoracic spines. That was in 1992. Julie Cox Cid, my daughter is the catalyst that made this book happen. Without her staunch, tender, and caring interest in this work, it would not have come to fruition. Doctors of Chiropractic know and love her as I do. She is truly a unique, good, and loving daughter.

There are now five instructors, accredited by National University of Health Sciences, who teach my work. Without them I could not continue. These wonderful and exceptionally talented men are Drs. Ralph Kruse, Kurt Olding, George Joachim, Dean Greenwood, and Lee Hazen. Their expertise makes teaching and training chiropractors in this work possible. They are the future of my life’s work.

Ram Gudavalli, PhD, is the foundation of research in my work. Without him there would not be federally funded research with the National Institutes of Health and the Health Resources and Services Administration of the Department of Health and Human Services. His efforts to gain federal funding for our research brings to recognition the research department at Loyola Stritch School of Medicine and the Hines Veterans' Administration hospital where our research of the lumbar and cervical spine takes place. It is also done in collaboration with Palmer College of Chiropractic and the National University of Health Sciences. My personal thanks to National for their lifetime acceptance of me as a post graduate faculty member and contributor to the University.

In my clinic, my son, Dr. Jim II, has assisted me in data collection from patient hands-on study. His biomechanical skills are strong and his input guides my development of the technique and the instrument used in its delivery.

It is to my family – my wife, Judi, and my four children (Julie, Jill, Jim and Jason) and my eight grandchildren – that this work is dedicated. Only they will fully understand.

- James M. Cox, DC, DACBR
INTRODUCTION

This fourth edition contains the last 10 years of cervical spine research, totally replacing that of the third edition chapters 1 to 5. It covers the mechanism, diagnosis and treatment of neck, shoulder and arm pain utilizing Cox® Technic Flexion Distraction and Decompression spinal manipulation adjustment. It is the standard for Cox® Technic today.

To practice chiropractic medicine today with the research driven federal and private funded studies of Cox® Flexion Distraction and Decompression spinal manipulation is an honor and privilege. Why do I say this? Because Cox® Technic Flexion Distraction and Decompression spinal manipulation incorporates distraction with the chiropractic spinal adjustment, it is the best of administered spinal manipulation. Just look at the following papers on intervertebral disc treatment to understand the brilliance of the future.

Kuo 1 writes that traction biomechanics in the porcine model include disc height recovery, foramen area enlargement, and intradiscal pressure reduction. This was a study of 48 thoracic discs divided into 3 groups: intact, degraded without traction, and degraded with traction. From day 4 to day 6, half of the degraded discs received a 30 minute traction treatment per day (traction force: 20kg, loading: unloading – 30 sec: 10sec). With traction treatment, straightened collagen fibers increased within the degraded annulus fibrosus, and the annulus pores were less occluded. Both molecular transportation and cell viability increased, but not to the intact level. CONCLUSION: TRACTION TREATMENT IS EFFECTIVE IN ENHANCING NUTRITION SUPPLY AND PROMOTING DISC CELL PROLIFERATION OF THE DEGRADED DISCS.

These same findings were shown in our federally funded study of the lumbar spine biomechanics when the spine is treated with Cox® Flexion Distraction and Decompression spinal manipulation – increased disc space height, drop in intradiscal pressure, 28% increase in foraminal area, and physiological range of motion attainment of the facet joint complex. 2 – 8

Guehring et al 9 astounded back pain care with the findings that 28 days of compression in a rabbit model caused degeneration of the intervertebral disc via MRI study. Then 28 days of distraction regenerated the disc. Distraction resulted in disc rehydration, stimulated extracellular matrix gene expression, and increased numbers of cells. Disc distraction enhances hydration in the degenerated disc and may also improve disc nutrition via the endplates. Guehring showed that spinal distraction reversed disc degeneration.

Hee et al 10 replicated the Guehring study on human intervertebral discs. Again, 28 days of disc compression resulted in degeneration of the cartilaginous endplate and in a decrease in the osseous endplate vascular channel volume, both of which led to the degeneration of the intervertebral disc. Unloading and 28 days of distraction allowed the regeneration of the extracellular matrix in both the endplate and the recovery of vascular channels.

Hee et al 11 compressed the intervertebral disc in the rabbit model and caused disc degeneration and distraction resulted in disc regeneration. Compression of the disc not only resulted in degeneration of the cartilaginous endplate, but a decrease in the osseous endplate vascular channel volume. Unloading and distraction allowed the regeneration of the extracellular matrix in both the endplate and the recovery of vascular channels.

Shirazi-Adl et al 12 reported that disc nutrient concentrations could fall to levels inadequate to maintain cellular activity or viability, resulting in cell death and disc degeneration. He stated the cells of the intervertebral disc are responsible for making and maintaining the extracellular matrix. They are supplied with essential nutrients by diffusion of the blood supply.
through mainly the cartilaginous endplates and disc tissue. Decrease in transport rate and increase in cellular activity may adversely disturb the intricate supply-demand balance leading ultimately to cell death and disc degeneration. Cell death initiates as the cartilaginous endplate diffusion drops to 40%.

Can you sense the vitality and interest that our form of spinal manipulation will generate in the future? We will incorporate excellent nutritional sources of chondroitin sulfate from perna canaliculus for disc nutrition and distraction decompression Cox Technic to stimulate circulation from the cancellous vertebral body through the cartilaginous endplate. The potential application of these principles represents a great contribution to human back pain care.

Respectfully submitted,

James M. Cox, DC, DACBR

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CHAPTER 1

BIOMECHANICS OF THE CERVICAL SPINE
Biomechanics begins with basic structure and function of the cervical spine. During strenuous construction work with participants lifting 25%, 50%, and 75% of their maximum shoulder height static strength at neutral, maximally flexed, and maximally extended neck postures, electromyography shows the sternocleidomastoid muscle was most active at the extended neck posture and the upper trapezius muscle at the flexed neck posture. This study indicates that the neck muscles play an active role during lifting and holding tasks at shoulder height and such tasks could be probable risk factors associated with neck disorders prevalent among construction workers. Consider that Klippel-Feil syndrome causes hypermobility of the non-fused adjoining segments and may strongly predispose to more disc extrusions; thus a situation for serious neck pain under strenuous lifting. Then consider that decreased posterior disc height and/or anterior disc space increase, increases facet loading. Stiffness of the lower cervical spine, caused by degenerative disc changes and osteopenia, might contribute to upper cervical spine injury in response to low-energy trauma. The nerve root sizes of the cervical spine show that the C7 ventral ramus has the largest cross sectional area at 12.1 mm(2), C8 at 10.7 mm(2), C6 at 10.6 mm(2) and C5 at 7.1 mm(2). The ranges of motion of the cervical spine during activities of daily living are very small but become greatly stressed under anatomical or work related stresses. Consider that the combined structural and functional changes described here are found in the heavy construction workers described at the outset; this allows the picture of pain production when such pathological stresses are present in the neck of such workers. Studies show that although the sagittal alignment of the cervical spine is not associated with neck symptoms, degenerative changes are associated with the severity of neck pain in females.

**NEUROLOGY OF THE CERVICAL SPINE**

The Cruveilhier plexus is the interneural connections between the dorsal rami of the upper cervical nerves. It is seen in 86.7% of cadavers and is composed primarily of sensory fibers, but occasional motor fibers were identified. For C-1, a communicating loop joined the medial branches of C-2 on 65.4% of sides. On 29.4% of sides, this loop pierced the obliquus capitis inferior muscle before joining C-2. On 54% of sides, a communicating loop joined the medial branches of the dorsal rami of C-2 and C-3; and on 15.4% of sides, a communicating loop joined the medial branches of the dorsal rami of C-3 and C-4. No specimen had communicating branches between the dorsal rami of cervical nerves C-5 to C-8. Articular branches arose from the deep surface of the interneural connections as they crossed the adjacent facet joint on 34.6% of sides. Loops giving rise to fibers that terminated into surrounding musculature were seen on 35% of sides. Innervation of the intervertebral disc is multisegmental and both sympathetic and parasympathetic. The C5–C6 intervertebral disc is innervated multisegmentally from neurons of the C2-C8 dorsal root ganglion and sympathetic ganglion. Overall, 79.6% of the nerve fibers innervating the disc were sensory nerves and 20.4% were autonomic nerves. Furthermore, 23.9% of the nerve fibers innervating the disc were afferent sensory pain-related nerves, 8.9% were efferent sympathetic nerves, and 11.5% were efferent parasympathetic nerves. These findings may explain the wide-ranging and chronic discogenic pain that occurs via the somatosensory and autonomic nervous system.

The sinuvertebral nerves at C0-C1, C1-C2, and C2-C3 intervertebral levels and their anterior intraspinal distribution arose from two roots, a somatic root (from the spinal nerve or ventral ramus or both) and a sympathetic root (from the vertebral artery plexus or superior cervical ganglion). The C1 and C2 sinuvertebral nerves were variable in number. The C2 and C3
EVIDENCE-BASED CLINICAL CASE MANAGEMENT WITH COX® SPINAL MANIPULATION

Referenced Papers on Cox® Flexion Distraction and Decompression Spinal Manipulation Clinical Outcomes

At the outset, realize that evidence based clinical practice is the strength of Cox® Technic. Lawrence described evidence-based clinical practice in *Insights from Palmer College, Fall 2011* as being three things: best research evidence, clinical expertise, and patient preferences and values.

The definition of *Evidence Based Medicine and Best Practice* was approved and passed by the American Chiropractic Association in September 2004. It uses current best evidence in making decisions about the care of individual patients. It invalidates previously accepted diagnostic tests and treatments and replaces them with new ones that are more powerful, more accurate, more efficacious, and safer.

Why Cox® Technic Flexion Distraction And Decompression Spinal Manipulation?

- It combines the best aspects of chiropractic, osteopathic, decompression, and distraction procedures for best clinical application by the chiropractor.
- It is evidence based clinical outcome documented by federal and private research studies.
- Increasing numbers of patients do not tolerate high velocity adjustments (spinal stenosis, herniated intervertebral disc, degenerative disc disease, degenerative spinal scoliosis, DISH, facet disease).
- It is safe as shown by the Ndetan study (below). 357

**COX® FLEXION DISTRACTION SHOWED ALMOST NO ADVERSE SIDE EFFECTS IN ITS CLINICAL APPLICATION OF MANIPULATION TO DOCTOR AND 1 IN 54 OF PATIENTS BEING MANIPULATED.**

Distributions of injuries associated with adjusting techniques and specifically training-related activities at Parker College of Chiropractic, 2006 (student perception of injury sources).

<table>
<thead>
<tr>
<th>Adjusting Technique</th>
<th>#cases</th>
<th># injuries to doctor</th>
<th># injuries to patient</th>
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<tr>
<td>Diversified</td>
<td>280 cases</td>
<td>61</td>
<td>74</td>
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<tr>
<td>Thompson</td>
<td>142 cases</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td>Gonstead</td>
<td>135 cases</td>
<td>31</td>
<td>39</td>
</tr>
<tr>
<td>Cox F/D</td>
<td>54 cases</td>
<td>0</td>
<td>1</td>
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mobility. Gentle downward pressure is applied to the C5 vertebral motion segment as headpiece extension is applied.

**Extension Subluxation and Treatment:**

Figure 34 shows extension subluxation of C5 on C6 in neutral lateral projection while Figure 35 demonstrates sagittal narrowing of the intervertebral foramen at C5-C6 due to the posterior subluxation of C5.

Figure 36 shows the contact on the patient's C5 spinous - transverse processes bilaterally with the doctor's left hand to apply cephalward long Y-axis distraction as the cervical headpiece is slowly brought into long Y-axis distraction decompression or flexion distraction. The distraction is applied slowly until a gentle separation and distraction of the spinous processes and paravertebral muscles is felt.

**Lateral Flexion Subluxation and Treatment:**

Figure 37 shows right lateral flexion subluxation of C1 in relation to the dens of the axis by increased atlanto-dental interspace on the right (arrow).