

---

**LIGAMENT AND TENDON RELAXATION**

*(Skeletal Disability)*

**TREATED BY PROLOTHERAPY**

*(Fibro-Osseous Proliferation)*

---



THIRD EDITION

**LIGAMENT AND TENDON RELAXATION**  
*(Skeletal Disability)*

**TREATED BY PROLOTHERAPY**  
*(Fibro-Osseous Proliferation)*

By

**GEORGE STUART HACKETT, M.D., F.A.C.S.**  
*Consulting Surgeon, Mercy Hospital  
Canton, Ohio*

---

*With Special Reference to  
Occipito-Cervical and Low Back Disability—Trigger Point  
Pain, Referred Pain, Headache and Sciatica*

---



**CHARLES C THOMAS • PUBLISHER**  
*Springfield • Illinois • U.S.A.*

CHARLES C THOMAS • PUBLISHER  
BANNERSTONE HOUSE  
301-327 East Lawrence Avenue, Springfield, Illinois, U.S.A.

*Published simultaneously in the British Commonwealth of Nations by*  
BLACKWELL SCIENTIFIC PUBLICATIONS, LTD., OXFORD, ENGLAND

*Published simultaneously in Canada by*  
THE RYERSON PRESS, TORONTO

This book is protected by copyright. No part of it may be reproduced in any manner without written permission from the publisher.

© 1956, 1957 and 1958, by CHARLES C THOMAS • PUBLISHER  
First Edition, 1956  
Second Edition, 1957  
Third Edition, 1958

Library of Congress Catalog Card Number: 57-13257

*Printed in the United States of America*

## PREFACE TO THIRD EDITION

The importance of the work presented in this book lies in the fact that for the first time in history the most frequent cause of chronic painful skeletal disability has been definitely established. A method of confirming the diagnosis and a successful treatment have been developed.

Within the attachment of weakened ligaments and tendons to bone, the sensory nerves become overstimulated by abnormal tension to become not only the origin of specific local pain, but also definite areas of referred pain throughout the body to as far as the head, fingers and toes from specific relaxed ligaments and tendons.

Prolotherapy. A treatment to permanently strengthen the "weld" of disabled ligaments and tendons to bone by stimulating the production of new bone and fibrous tissue cells has been developed.

Adoption of improved diagnosis and treatment of skeletal disability by orthopedic and neurological surgeons will reduce spinal fusion operations to 5 per cent of the peak attained in the postwar devastating decade, just as goiter and mastoid operations were similarly curtailed by the adoption of improved scientific methods. Public resistance has already reduced the operations to approximately 50 per cent because of the high degree of failures which is recognized by both the medical profession and the public. Improved diagnosis will also obviate the exploratory laminectomy operations in search for suspected ruptured disc. Strengthening of the posterior spinal ligaments will prevent many discs from rupturing. Adoption of the treatment outlined in this book will bring permanent relief to millions of sufferers who cannot attain it in any other way.

The previous editions have been completely revised with the inclusion of additional scientific developments to enable the reader to become more competent in the diagnosis and treatment of skeletal disability.

An important addition are ten dermatomes of referred pain and "sciatica" from disabled ligaments that normally maintain stability of the lumbosacral and sacroiliac articulations, and from disabled tendons of lumbar muscles. They are of such practical importance in diagnosis that they will do more to clear up the confusion of low back disability than anything previously presented. They should be included in all future works on low back disability.

Illustrations and descriptions of trigger points and referred pain areas from *somatic tendon relaxation* throughout the skeleton are of especial importance and complement *ligament relaxation* in clearing up the confusion in diagnosis.

A revised illustration of ligaments and their trigger points of pain includes the improved positions for inserting and directing the needles for strengthening the ligaments by PROLOTHERAPY. The technic of treatment is described in detail.

Effective proliferants of new bone and fibrous tissue cells are described in detail as to their preparation, strength, combinations, number and frequency of both office and hospital treatments, together with the aftercare of the patient.

Ligament and tendon disability resulting from operations is fully discussed, including treatment and case reports.

An index has also been provided for convenience.

I am gratified by the widespread adoption of Prolotherapy for skeletal disability by competent physicians in this and other countries, which has made the treatment more available to humanity, and its demonstration to other physicians.

I appreciate the contribution of medical sections and magazines, and the press and radio in bringing this work to the attention of physicians and the awaiting public.

The appreciation and loyalty of patients, visiting physicians, and assistants continues to be an inspiration.

G. S. H.

## PREFACE TO SECOND EDITION

As this book goes into its second edition, significant advances in skeletal disability have been included in Part III.

1. Tendon Relaxation as a common cause of disability at the attachment of muscle to bone, particularly in the back, is presented for the first time.

2. A dermatome of referred pain areas into the groin, abdomen, genitalia, buttock and extremities from relaxed ligaments of the lumbar and pelvic articulations directs attention to specific ligaments of the lumbar and pelvic articulations, which are the cause of more chronic low back disability than any other entity.

3. Improved technic which simplifies the treatment of ligament relaxation in joint instability of the lumbar spine and pelvis.

4. A proliferating solution suitable for ligament and tendon stabilization in office treatment.

5. Observations on disabilities resulting from laminectomy, arthrodesis, and cordotomy operations in relation to the original disability of ligament relaxation in joint instability.

G. S. H.





## PREFACE TO FIRST EDITION

This presentation has the objective of assembling for the first time the fragments of knowledge that have previously been recorded concerning the disability of articular ligaments and correlating that knowledge with the accomplishments which I have been able to make in the past 16 years while investigating ligament disability from the standpoint of embryology, anatomy, pathology, etiology, symptoms, diagnosis, confirmation of diagnosis, trigger points of pain, referred pain areas, and treatment by a method of strengthening weakened ligaments to re-establish joint stabilization and permanently eliminate pain and joint disability.

It has been my observation that after the early anatomists had dissected, described, named and defined the function of ligaments, they were then taken for granted, and little has been done since to ascertain anything concerning any disability to which they succumb.

The acute disabilities of strain, sprain and torn ligaments have been understood and treated if diagnosed, but there has never been investigation that would lead to an understanding of what, if anything, pathological continued relative to the ligament when recovery was not complete in a short period of time.

This was probably due to the deep inaccessible location of the ligaments, particularly those of the spine and pelvis, for physical examination and the impossibility of detecting them on roentgenograms.

Considerable knowledge has been acquired concerning muscle, bone, intervertebral disc, spinal cord and fluid, and the nerves emanating from the cord. Consequently, any disabilities of the back were attributed to one of the known entities, and much confusion has persisted in diagnosis which in turn resulted in much unsatisfactory treatment.

Further confusion has resulted because, in this highly specialized era, there is a natural tendency for each specialist to fit the

symptoms to something in his specialty with which he has some knowledge, or refer them to the neurological or orthopedic specialists. The former know little about and have less interest in the skeleton, while the latter are in the same category relative to the neurological aspects of the low back.

It was, therefore, advisable that ligaments be investigated and presented in a way "that he who walks might see and observe that which is true."

Truth will prevail, and I believe that the main facts in this presentation will endure "as long as man walks on two feet."

To my knowledge this is the first monograph written on ligaments. The fact that ligaments get a portion of a line to show that the author is cognizant of their existence is indicative of the importance with which they are held in disability.

During a period of over 20 years while engaged in a tremendous traumatic practice, I was also regularly called upon for special examinations by approximately 70 accident insurance companies to report accurate diagnoses and prognoses. I became aware of the indefinite and variable conclusions of our best diagnosticians in dealing with low back disability.

Finally, in 1939, I arrived at the conclusion that relaxation of the articular ligaments was responsible for a considerable number of low back disabilities.

I decided to attempt strengthening the ligaments by the injection of a proliferating solution within the fibrous bands to stimulate the production of fibrous tissue.

The treatment proved to be satisfactory almost from the beginning, and it was cautiously extended until now articular ligaments of the entire spine and pelvis and some other joints are treated with great satisfaction both to the patient and to me.

My interest was stimulated to survey all the literature available on the subject of ligament disability. From the meager amount available, I have quoted the important reports on nerve supply to the ligaments and the few reports on tenderness and referred pain areas.

The knowledge acquired from observations while making over 3000 injections within the posterior ligaments of the lumbar spine and pelvis has enabled me to chart trigger points of pain

and referred pain areas from individual ligaments which are of inestimable value in diagnosis, verification of the diagnosis, and treatment of ligament relaxation.

In my experience, relaxation of the posterior articular ligaments of the lumbar spine and pelvis are the cause of more low back disability than any other entity. It is also the cause of more referred pain into the lower extremities than any other disability.

A report is made of the animal experiments which have revealed the production of bone and fibrous tissue at the fibro-osseous junction of ligaments from the stimulation of a proliferating solution, when injected within the fibrous bands of tendons. This accounts for the satisfactory clinical results which have been accomplished in joint stabilization by strengthening the relaxed ligaments.

Ligament relaxation is the only condition (disability or disease) in which the diagnosis can both be confirmed before treatment and verified at each treatment.

In this presentation an effort has been made to present it in such a way that any physician may be able to carry out the procedure and at the same time preserve in one article the progress that has been made so that many in the future will have a basis for improving and expanding the diagnosis and treatment of ligament disability.

I desire to express my appreciation to a score or more genuine individuals who recognized the importance of this investigation and made a cheerful contribution that was always an inspiration.

Dr. Donald G. Henderson's preparation of the histological specimens and microphotography are of significant importance.

I am particularly grateful to Margaret Ann Lewis, R.N., my associate as nurse, secretary, statistician and assistant in experimentation on animals, proliferants and anaesthetics. Her cheerful devotion to our objective has been a notable contribution to its success.

G. S. H.



## CONTENTS

	<i>Page</i>
<i>Preface to Third Edition</i> .....	v
<i>Preface to Second Edition</i> .....	vii
<i>Preface to First Edition</i> .....	ix
Etiology .....	6
Pathology .....	11
Symptoms .....	14
Pain (Trigger Point Pain, Referred Pain, Sciatica) .....	16
Trigger Point Pain .....	18
Referred Pain .....	18
Sciatica .....	23
Diagnosis .....	25
History .....	25
The Physical Examination .....	38
Confirmation of Diagnosis .....	48
Roentgenograms .....	49
Treatment—Prolotherapy .....	51
Cervical and Upper Dorsal Spine .....	53
Low Back .....	54
Treatment of Sacrococcygeal Ligament .....	62
Treatment of Hip Articular Ligament .....	62
Acromio-clavicular Joint .....	63
Proximal Radio-ulnar Joint (Elbow) .....	63
Wrist Joint .....	65
Ankle Joint .....	67
Foot .....	69
Tendon Relaxation .....	69
Tendon Relaxation Trigger Points—Figure 26 .....	72
Close-Jointed vs. Loose-Jointed .....	77

	<i>Page</i>
Subsequent Treatment .....	80
Proliferants—Anesthetics .....	81
Medication—Aftercare .....	83
Discretion in Technic .....	87
Additional Observation on Referred Pain .....	88
Animal Experiments .....	94
History of Proliferation .....	100
History of Ligament Treatment .....	102
Résumé of Low Back Treatment .....	104
Additional Considerations—Comment .....	109
Statistics .....	115
Case Reports .....	116
Material Used by the Author .....	134
Post-treatment Instructions .....	135
Back Exercises .....	136
<i>Bibliography</i> .....	138
<i>Index</i> .....	143

## ILLUSTRATIONS

<i>Figure</i>	<i>Page</i>
1. Trigger points of pain and needles in position for confirmation of the diagnosis and for treatment of ligament relaxation of the lumbosacral and pelvic points . . . . .	26
2. Iliolumbar ligament . . . . .	27
3. Posterior sacroiliac ligament . . . . .	28
4. Sacrospinus and sacrotuberus ligaments . . . . .	29
5. Sciatica . . . . .	30
6. Iliolumbar and posterior sacroiliac . . . . .	31
7. Posterior sacroiliac (lower), sacrospinus and sacrotuberus ligaments . . . . .	32
8. Posterior (lower) sacroiliac, sacrospinus and sacrotuberus ligaments, and sciatica . . . . .	33
9. Referred pain of iliolumbar, posterior sacroiliac, sacrospinus and sacrotuberus ligaments, and sciatica . . . . .	34
10. Hip articular ligaments . . . . .	35
11. Iliocostalis and sacrospinus tendons . . . . .	36
12. Patient seated astride chair for occipital, cervical and upper dorsal diagnosis and treatment including "whiplash injuries." Left thumb and index finger astride the supraspinus ligament between spines . . . . .	41
13. Vertical section through lumbar vertebrae. Vertical line passes through the two articular fulcrums. One and one-half inch needle in position for confirmation of the diagnosis and for treatment . . . . .	42
14. Bony landmarks for orientation in location of trigger points and needle insertions in the lower lumbar and pelvic ligament . . . . .	43

<i>Figure</i>	<i>Page</i>
15. Patient reclining relaxed for confirmation of the diagnosis and treatment of lower dorsal, lumbar and pelvic ligaments. Left thumb and finger astride lumbosacral (5th lumbar) supraspinus ligament for insertion of needle into lumbosacral interspinus ligament . . . . .	58
16. Transverse section through sacroiliac joints with needle in position of full insertion to joint margin of posterior sacroiliac ligament . . . . .	59
17. Roentgenogram of the pelvis in which a wire surrounds the margin of the sacroiliac joint . . . . .	60
18. "Man's belt" (1¼-inch wide such as regular Army belt) binds sacroiliac joints together . . . . .	61
19. Acromio-clavicular joint. Direction of needle for insertion in ligaments and joint space . . . . .	64
20. Elbow. Needle in position at "trigger point" in "Tennis Elbow" . . . . .	64
21. Wrist. Dorsal ligament between radius—2nd and 3rd metacarpals, passing over scaphoid, lunar, trapezoid and capatellum bones . . . . .	65
22. Wrist. Needle in position at "trigger point" of carpal bone ligament relaxation . . . . .	66
23. External lateral ligament of ankle. (3) Calcancocuboid ligament of foot . . . . .	67
24. Needle in position of insertion (left and middle) into the external lateral ligament of the ankle and (right) into an articular ligament of the foot . . . . .	68
25. Ligament and tendon relaxation in occipital and cervical disability . . . . .	70
26. Tendon relaxation . . . . .	73
27. Close-jointed and loose-jointed characteristics . . . . .	78



<i>Figure</i>	<i>Page</i>
28. Camp shoulder brace #53 .....	86
29. (1-2-3-4). Microphotographs of sections from rabbit tendons following the injection of the proliferant, Sylnasol (G. D. Searle & Co.), within the fibrous strands . The same technic was used as that which is used clinically .....	95
30. Photograph of rabbit tendons at nine and 12 months after three injections of proliferating solution into the right tendons. <i>Left</i> , controls; <i>right</i> , proliferated. The tendons on the right reveal an increase in diameter of 40 per cent, which is estimated to double the strength of the tendon. The upper portion reveals the attachment of the ligament to the bone which has increased 30 per cent in diameter. The proliferating solution stimulates the production of new fibrous connective tissue cells which become organized into permanent non-classic fibrous tissue	96
31. Roentgenograms of the proximal end of the tibial tarsal bone of the rabbit with the attached gastrocnemius and superficial flexor tendons. The films were made one and three months after a single injection of proliferant solution had been distributed throughout the tendon .....	97
32. Animal Experimentation .....	98



---

**LIGAMENT AND TENDON RELAXATION**  
*(Skeletal Disability)*

**TREATED BY PROLOTHERAPY**  
*(Fibro-Osseous Proliferation)*

---



## LIGAMENT AND TENDON RELAXATION

“A joint is only as strong as its weakest ligament”—AUTHOR

**L**IGAMENTS supporting the skeletal articulations have been developed over millions of years to provide stabilization of the joints at all positions and limit the extent of motion in all directions.

The early anatomists dissected the ligaments and named them. Since that time, little has been done about them. Their function was taken for granted, and they were inaccessible for obvious determination of continued disability because they could not be observed or palpated and were not revealed on roentgenograms.

For several years I have interviewed medical students and recent graduates from medical schools throughout the country and abroad, and I have been unable to find any medical college in which the deep ligaments of the skeletal articulations are dissected or taught.

Recently I was not greatly surprised to discover, while in conversation with an internationally known surgeon whose name is attached to a type of spinal fusion, that he did not know of the existence of the ilio-lumbar ligament which is important in preventing abnormal movement of the 5th lumbar vertebra on the sacrum and which is usually relaxed in lumbosacral disability. It has a definite trigger point of pain and frequently referred pain areas which are most significant in diagnosis.

In the literature there is an occasional mention of ligaments as being included in the tissues of an articulation, but rarely is there any mention of ligament disability.

At a recent meeting in an internationally known clinic a symposium on “backache” was held in which specialists from the various departments discussed 2000 cases. The cases were divided among 29 different diagnoses, but the word ligament was not mentioned either in the discussion or in the list of diagnoses.