

**Elaine Atkins
Jill Kerr
Emily Goodlad**

A Practical Approach to **Orthopaedic Medicine**

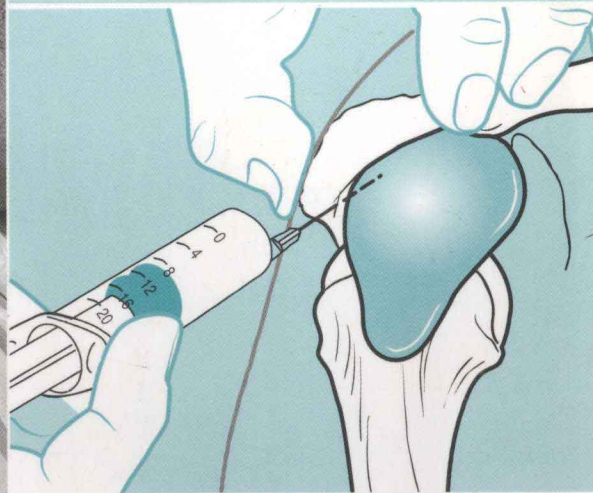
Assessment, Diagnosis and Treatment

**THIRD
EDITION**



Foreword by **Monica Kesson**

Originally written by
**Monica Kesson &
Elaine Atkins**



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A Practical Approach to Orthopaedic Medicine

Assessment, Diagnosis and Treatment

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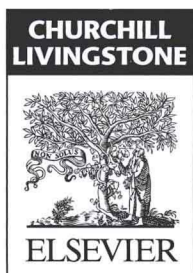
by

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Foreword by
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A Practical Approach to
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The original authors, Monica Kesson and Elaine Atkins, studied physiotherapy together at St Thomas' Hospital, London, in the early 1970s, where the methods of Dr James Cyriax were taught. From that original inspiration they have continued to develop their clinical practice encompassing a wider scope of physiotherapy skills but always building on the solid, logical base provided by orthopaedic medicine.

Jill Kerr and Emily Goodlad have joined Elaine Atkins in the writing of this third edition. Jill and Emily each have over 20 years' experience in orthopaedic medicine. The development and progression of this sound approach into the current clinical setting has driven them to be both reflective and innovative in their valuable contribution to the text.

All the authors of the third edition now combine clinical practice with a teaching commitment to the Society of Orthopaedic Medicine, supporting the development of collaborative partnerships with higher education institutions and multidisciplinary working. As course principals and tutors they are involved in advancing education in orthopaedic medicine and are particularly interested in empowering students to learn through clinical reasoning and reflective practice.

Foreword to the third edition

Elaine Atkins and I had a dream!

As students at St Thomas' Hospital in the early 1970s we were inspired by Jenny Hickling who taught us the methods of Dr James Cyriax. The clinical reasoning instilled in us through his approach has stood us in good stead throughout our careers. We have always built on those early foundations, integrating the 'Cyriax approach' into our clinical practice, experimenting with and developing those core skills.

With this in mind Elaine and I felt that the Cyriax approach should be made more accessible and not be allowed to lie dormant. With the first two editions of *Orthopaedic Medicine: A Practical Approach* we aimed to develop the evidence base to support orthopaedic medicine and to bring Cyriax's work with us into the 21st century.

It is therefore a great pleasure to see the dream continue with the addition of Jill Kerr and Emily Goodlad, working alongside Elaine, to develop this new edition of the text. I have always felt that it is important to let go and to hand over to the next generation. This enthusiastic new team has worked hard to extend the text and to stimulate fresh ideas. They have demonstrated that orthopaedic medicine can, and will, continue to develop.

Empowering students to learn has always been the main focus of the text and the courses it supports. The current team of authors will see this text integrated into recent technological advances which allow the added dimension of online access through eBooks and the website 'Evolve,' a learning tool designed to work alongside specific textbooks, allowing students to test their knowledge, to stimulate clinical reasoning and to enhance learning.

I am proud to have been instrumental in the first two editions, but the biggest compliment to me is that Elaine, Jill and Emily wanted the dream to continue and tribute should be paid to their enthusiasm, commitment and hard work in further developing orthopaedic medicine.

Monica Kesson MSc MCSP
March 2009

Foreword to the second edition

Almost in their first paragraph, authors Monica Kesson and Elaine Atkins note how James Cyriax was, at the start of his career, 'intrigued' by an influx of patients with soft-tissue pain presenting with normal X-rays.

A fuller account of those early days may help to put this splendid new edition of *Orthopaedic Medicine: A Practical Approach* in its historical context. In 1926, when Dr Cyriax began as an orthopaedic house surgeon at St Thomas' Hospital, he noticed that a significant element of the out-patients department caseload – those lacking 'bony abnormalities' – were referred to the massage department with a diagnosis no more specific than, say, 'painful shoulder'. His curiosity was piqued.

Dr Cyriax's diagnostic and physical journey from surgery to orthopaedic medicine is the main-spring of this book. In the late 1920s he followed these patients down St Thomas' long corridor to the massage department to find them in rows, still with not a diagnosis among them, receiving diffuse heat and diffuse superficial massage to the area of skin where their pain was perceived. Treatment, it transpired, was not on the basis of need but, as it were, on the basis of traditional supply.

He decided there and then to devise somehow a way of pinpointing the source of these pains so that treatment could be diverted from the symptom to the source. He did not know what he was looking for, nor how he would do the looking. His only tool was clinical examination.

It took several years before St Thomas' set up a dedicated clinic in the massage department (later the Department of Physical Medicine). Here, month after month, Dr Cyriax systematically subjected each tissue which could be a source of pain to a variety of stimuli and tensions, seeking stimuli that would create or aggravate the patient's pain, and coherent patterns of positive and negative responses which would incriminate an individual structure.

To the best of my recollection, his central insight came on a London bus. The thought abruptly crystallized that a strongly resisted contraction would aggravate pain emanating from contractile tissues – without involving inert tissues; and that passive stretching put significant additional load not upon tissues which were contractile but on those which were inert. Diagnosis by selective tension was born; the conditions of an entire branch of medicine became amenable to diagnosis and treatment.

By 1942, when I joined the department, things were moving fast. New diagnoses emerged in rapid succession. Accurate transverse friction massage was tried and its success or failure was used to confirm tentative diagnoses. We students sat in at the clinics. We learned to monitor progress by re-testing the patient's physical signs before and after each treatment. With growing *esprit de corps*, we realized that our ideas and suggestions commanded respect. Perhaps best of all, our patients were discharged, pain-free, in as little as 2–3 weeks. During those years a new medical discipline came into being.

Since the 1940s a host of new conditions – and new treatments – have been added to the canon of musculoskeletal lesions. The contribution of physiotherapy to the establishment of orthopaedic medicine has been enormous; it is a fitting provenance for the authors of this scholarly and practical work. This beautifully organized volume, with its many advances, would have been greatly admired by my late husband, and I commend it without hesitation to a new generation.

Patsy Cyriax MCSP
October 2004

Preface

Orthopaedic medicine is a specialism in medicine that is dedicated to the examination, diagnosis and non-surgical treatment of disorders of the musculoskeletal system (i.e. disorders of joints, ligaments, muscles and tendons; the means by which we move). The specialism is founded on the life's work of Dr James Cyriax MRCP (1904–1985), for many years Honorary Consultant Physician to the Department of Physical Medicine, St Thomas' Hospital, London, and is acknowledged as the bed-rock of musculoskeletal medicine and therapy.

The Society of Orthopaedic Medicine (SOM), an educational charity, was established in 1979 to continue to promote the theory and practice of orthopaedic medicine – 'the Cyriax approach' – chiefly through its educational courses. The courses contribute to postgraduate programmes in medicine and physiotherapy and take place throughout the year at a variety of different venues, both nationally and internationally. The over-arching aim of the SOM is to continue to develop and integrate the specialism into medical and physiotherapy practice.

Cyriax was prolific in his writing and produced several editions of his key texts (Cyriax 1982, 1984; Cyriax & Cyriax 1983, 1993). Following his death in 1985 there was concern that his writings might not be advanced in the light of continuing research. With the first edition of *Orthopaedic Medicine: A Practical Approach* the aim was to compile a text that would both complement and update the existing texts in orthopaedic medicine and we set out to trawl the more recent research findings to support, or refute, the tenets established by Cyriax.

The content of this textbook is structured to link to the scheme of the SOM's educational course and the book is designed as a tool to enable postgraduate medical practitioners and physiotherapists, as well as other allied health professionals, to develop their skills in the management of musculoskeletal lesions.

The target audience for the first edition of this text comprised medical practitioners and physiotherapists who were past and present course students, in addition to those with a general interest in the specialism and undergraduate students. However, the healthcare world is constantly developing and expanding in line with social and political developments, and extended practice and a framework for multidisciplinary working are now in place. The theory and practice of orthopaedic medicine now extends into allied professions such as podiatry, osteopathy and specialist nursing, and the widening audience has been kept in mind in the preparation of this third edition.

Cyriax set high standards for innovative and reflective thinking in clinical practice and promoted the development of clinical experience underpinned by current evidence. The growth of the evidence base of orthopaedic medicine has gathered momentum and professionals have become more aware of the requirement to become both research minded and research active to be able to justify practice.

The second edition of *Orthopaedic Medicine* persisted with the challenge to support the specialism with evidence. Nonetheless, areas remain where there is neither evidence to support nor evidence to refute the approach. All those who practise in the musculoskeletal field are encouraged to continue to search and communicate the work of others, and to disseminate their own findings, to be able to substantiate further the original work of Cyriax and to promote enhanced patient care.

This third edition, re-titled *A Practical Approach to Orthopaedic Medicine*, to highlight the practical emphasis of the text, continues with the evidence-based approach. This is supported by the inclusion of evidence gained from the MSc Orthopaedic Medicine master's degree course, now delivered by the SOM and validated by Middlesex University.

Student-centred learning resources have been introduced in this edition via the EVOLVE website. This is an important innovation and we would encourage readers to visit this website to challenge their orthopaedic medicine knowledge.

Elaine Atkins, Jill Kerr and Emily Goodlad

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Dedication

To Monica Kesson

This book is dedicated to our dear friend and colleague Monica. Her inspiration, drive and hard work to further the orthopaedic medicine approach has been tireless. She has embraced the educational needs of the students and tutors alike, always striving to nurture, improve and develop. Monica supported us all as Fellows and has encouraged our professional development in orthopaedic medicine at every stage. She is still our guru and this book is for her.

Tell me and I forget. Teach me and I remember. Involve me and I learn.

Benjamin Franklin

Acknowledgments

We continue to acknowledge the valuable contribution of all those mentioned for the previous editions. For this edition we are especially grateful to the following people, all of whom have been unstinting in their support and patience: Dr David Knott, for his major contribution to the injection section; Paul Hattam, Alison Smeatham, Gordon Smith and Dr Bob Smith, for their input and advice on up-to-date injection information; Rita and Veronika of Elsevier, who have been patient and encouraging; all our colleagues in the Society of Orthopaedic Medicine, for giving us valuable feedback on the earlier editions, for feeding us new information and for continuing to support our endeavours for the third.

We acknowledge the early icons of orthopaedic medicine who through their enthusiastic example provided such inspiration: Jackie Caldwell, Anne Crofts, Liz Edwards, Jenny Hickling, Stephanie Saunders and, of course, Dr James Cyriax himself. Monica Kesson must now be added to the list. She has devoted herself to teaching the principles propounded by Dr Cyriax with unswerving determination to take the orthopaedic medicine approach ever forwards.

The following anatomy texts have been invaluable and deserve special mention:

- Gosling, J.A., Harris, P.F., Humpherson, J.R., et al., 2008. *Human Anatomy: Color Atlas and Textbook*. Mosby, Edinburgh
- McMinn, R.M.H., Gaddum-Rosse, P., Hutchings, R.T., et al., 1995. *McMinn's Functional and Clinical Anatomy*. Mosby, Edinburgh
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- Palastanga, N., Field, D., Soames, R., 2006. *Anatomy and Human Movement*, 5th edn. Butterworth-Heinemann, Edinburgh
- Standring, S., 2009. *Gray's Anatomy: the Anatomical Basis of Clinical Practice*, 40th edn. Churchill Livingstone, Edinburgh

For all their support in the past, thanks to Rod, so sadly no longer with us, Andrew and Denise.

And finally: our families have been unflinching in their support and encouragement and so understanding of all that it has taken to see this third edition through; our gratitude and love are extended to them. Thanks to: Lorna Ducharme, Jean and Jackie Campbell, Margaret Blackbourn, Cathie Goodlad and David Muir. Special thanks to Clive, Kate and Tess; John, Jake and Josh; and John, Maggie and Finlay.

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Section

1

Principles of orthopaedic medicine

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Introduction to Section 1

The aim of this book is to provide principles of diagnosis and treatment that can be applied to any of the soft tissue lesions encountered in clinical practice.

This first section presents the theory behind the principles and practice of orthopaedic medicine, beginning with the theory underpinning the assessment procedure towards clinical diagnosis. Clinical diagnosis involves the development of a hypothesis through the consideration of both subjective and objective findings and each is discussed.

The histology and biomechanics of the soft tissues follow, with a review of the healing process, aiming towards an understanding of the effects of injury on the soft tissues. This should enable the application of appropriate treatment to the different phases of healing to achieve the restoration of full, painless function.

Building on the theory of the first chapters, the first section ends with a presentation of the principles of treatment as applied in orthopaedic medicine and discusses the techniques of mobilization and injection, aims and application and indications for use.

Clinical tips are provided throughout Section 1 to emphasize clinical application and indications for use.

In December 1995 injections were declared to be within the scope of physiotherapy practice and the

Chartered Society of Physiotherapy (CSP) endorsed a Clinical Guideline for the Use of Injection Therapy by Physiotherapists that was originally prepared by the Association of Chartered Physiotherapists in Orthopaedic Medicine (ACPOM), a clinical interest group of the CSP (1999). Since then, physiotherapists working as rheumatology or orthopaedic practitioners, as seniors in hospital clinics or in private practice have risen to the challenge, taking care to comply with stringent protocols and directions (CSP 2008).

Courses in orthopaedic medicine (see Appendix 1) provide an excellent grounding in the theory and practice of injections, particularly since the modules are attended by both doctors and physiotherapists in an atmosphere of shared experience. Separate courses in injection therapy have now been developed that include supervised practice in the clinical setting to allow the demonstration of competence. More relevant, however, is the development of confidence in performing the techniques, facilitated by continued application and evaluation of practice.

At the time of writing, physiotherapists may attend prescribing courses but limited prescribing rights, including those applicable for musculoskeletal injections, are still under discussion. Clearly a close relationship must be maintained with the medical profession, but physiotherapy autonomy should also be supported.

Within this text, injections must therefore be considered to be as pertinent to the physiotherapist reader as to the doctor. A brief presentation of relevant pharmacology and general considerations is presented. However, in view

of the scant pharmacology taught at undergraduate level, the physiotherapist may find it beneficial to explore some additional reading in this area.

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Chapter

1

Clinical reasoning in orthopaedic medicine

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SUMMARY

Orthopaedic medicine is based on the life's work of the late Dr James Cyriax (1904–1985). He developed a method of assessing the soft tissues of the musculoskeletal system, employing a process of diagnosis by selective tension, which uses passive movements to test the inert structures and resisted movements to test the contractile structures.

This chapter is divided into two parts. The first discusses 'referred symptoms' and includes patterns and 'rules' of referral of pain and other symptoms from different structures. The second, 'clinical examination', describes the theory behind Cyriax's logical method of subjective and objective examination, which, by reasoned elimination, leads to the incrimination of the tissue in which the lesion lies.

REFERRED SYMPTOMS

Patients usually complain of pain but there may be other symptoms that cause them to seek advice, such as stiffness, weakness, numbness and pins and needles. Since pain is the most usual complaint, it will form the basis of this discussion.

Whether right or wrong in their assessment, patients usually localize their pain as coming from a certain point and can describe the area of its spread, although sometimes only vaguely. Cyriax considered that all pain is referred and explored the pattern of referred pain to try to establish some rules that would help in its interpretation towards establishing its true source (Cyriax & Cyriax 1993).

The study of pain itself is a vast topic, most of which is outside the scope of this book, and the reader is

referred for a detailed account to the many other sources that confine themselves to the in-depth study of this field. Nevertheless, pain and its behaviour are relevant to orthopaedic medicine, particularly in the assessment procedures, both towards the achievement of an accurate clinical diagnosis and as a guide to the effectiveness of the treatment techniques applied.

To be able to identify the source of the pain, a thorough knowledge of applied and functional anatomy is essential, coupled with an understanding of the behaviour of pain, particularly in relation to its ability to be referred to areas other than the causative site. It is acknowledged that other influences can affect the perception of pain and within this chapter *referred pain* will be discussed, with a brief consideration of *psychosocial* factors.

Discussion of the possible mechanisms and patterns of referred pain

It is commonly found in clinical practice that pain of visceral origin can mimic that of somatic origin ('pain arising from noxious stimulation of one of the musculoskeletal components of the body', Bogduk 2005) and vice versa. Pain arising from pathology in the heart, for example, may produce a spread of pain into the arm, imitating the pain of nerve root sleeve compression from a cervical lesion. Similarly, mid-thoracic back pain may arise from a stomach lesion. Visceral pain tends to be inflammatory in origin, since the viscera are relatively insensitive to mechanical pressure, whereas somatic pain can arise from either or both causes (Lundeburg & Ekholm 2002).

There have been several suggestions put forward for the mechanism of referred pain and the more significant ones are discussed here. McMahon et al (1995) cite Sinclair who suggested that primary sensory neurons have bifurcating axons which innervate both somatic and visceral structures. Some evidence was found for this theory, but some of the findings were challenged, particularly as such axons had failed to be demonstrated in appreciable numbers. While unable to find neurons with visceral and somatic fields, McMahon et al mention that Mense and colleagues did find a few single sensory neurons with receptive fields in two tissues, in both skin and muscle in the tail of a cat, but overall there was scant support for Sinclair's suggestion.

More recently, Samedia et al (2003) have demonstrated peripheral axons dichotomizing (branching into two) into both the L5, L6 disc and groin skin in rats. This could provide a possible explanation for pain referred to the groin area from damage to the L5 and S1 nerve roots from L4-L5 and L5-S1 disc herniation in humans, in spite of the nerve supply of the groin area arising from the higher lumbar spinal nerves.

Evidence has been provided for the mechanism that visceral and somatic primary sensory neurons converge onto common spinal neurons, causing confusion in the ascending spinal pathways and leading to misinterpretation of the origin of the pain. The message from the primary lesion could be wrongly interpreted as coming from the area of pain referral (Vecchiet & Giamberardino 1997, Robinson 2003). This has been dubbed the convergence-projection theory.

A side-track from the 'convergence-projection theory' is the 'convergence-facilitation theory', attributed to McKenzie (cited in McMahon et al 1995), which claimed that the viscera are insensitive and that visceral afferent activity does not directly give rise to pain. It was suggested that an irritable focus was produced within the spinal cord, where somatic inputs would take over to produce abnormal referred pain in the appropriate segmental distribution. This theory was not generally accepted, however, since it denied that true visceral pain could exist. However, it did provide an explanation for heightened referred sensations, including that of secondary hyperalgesia (Vecchiet & Giamberardino 1997). Its basic concepts have been developed under the descriptor of 'central sensitization' that explains hyperalgesia and the prolongation of chronic pain as arising from the augmented response of signalling neurons in the central nervous system as a result of inflammation or compression of nerve structures (Niere 1991, Butler 1995, Mendelson 1995, Campbell & Meyer 2006).

As mentioned above, there are no separate ascending spinal pathways for the transmission of visceral pain, and sensations from the viscera are represented within the somatosensory pathways, that also transfer sensations from somatic structures (Galea 2002). This can lead to confusion in differential diagnosis between pain arising from visceral lesions and that arising from musculoskeletal lesions. Galea describes how the level of the spinal cord to which visceral afferent fibres project depends on their embryonic innervation and notes that many viscera migrate well away from their embryonic derivation during development, such that visceral referred pain may be perceived at remote sites.

Referred pain does not only present itself for misinterpretation between visceral and somatic structures but is also a phenomenon which may prevent accurate localization among the musculoskeletal tissues. Cyriax & Cyriax (1993) suggested that the misinterpretation of pain occurs at cortical level where stimuli arriving at certain cortical cells from the skin can be localized accurately to that area. When stimuli from other deeper tissues of the same segmental derivation reach those same cells, the sensory cortex makes assumptions on the basis of past experience and attributes the source of the pain to that same area of skin. This accounts for the dermatomal reference of pain but the theory can be extended to include the referral of other symptoms from structures within the same segment.