Integrating Pain Treatment into Your Spine Practice

Steven M. Falowski
Jason E. Pope
Editors

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Editors
Steven M. Falowski, MD
Neurosurgery
St. Luke's University Health Network
Bethlehem, PA, USA

Jason E. Pope, MD, DABPM, FIPP
Summit Pain Alliance
Santa Rosa, CA, USA

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Nothing would be complete or possible in my life without the devotion, love, and unwavering support from my wife, Cindy. Thank you for being my rock every day and fostering my pursuit of leaving a mark on our world. Your strength has become my inspiration, and I look forward to eternity with you.
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For all those patients who suffer with chronic pain, this book is meant to educate and bring awareness to those physicians who can help.

Steven M. Falowski, MD

To my loving children, Liam, Olivia, and Vivienne. Your joy and awe of the world inspire me to work towards helping create a better one.
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Jason E. Pope, MD, DABPM, FIPP

Preface

Spinal surgical intervention is an important treatment tool in the functional and structural restoration of patients. Contrasting one specialty to another, neuromodulation is one that recently has had an unparalleled growth trajectory. This gives a spine surgeon an important role in treating patients throughout their disease process. It is the understanding that a technically successful surgery does not always translate into the patient results that one desires and that the treatment of chronic pain is part of that continuum. Therapies are available when pain persists following surgery, or perhaps when pain is present without a surgical pathology. It is the effort of this book to underscore the concept of concurrent, parallel pathway specialization development, moving away from polarized approaches, towards the integration of pain care in the surgeons' practice. This integration of specialties is the diversity seen in the multidisciplinary approach of the neuromodulation community. The journey has been a rewarding one and we hope to inspire each reader to consider pain care in their practice.

Bethlehem, PA, USA — Steven M. Falowski, MD
Santa Rosa, CA, USA — Jason E. Pope, MD, DABPM, FIPP

Contents

Contributors

Kasra Amirdelfan, MD IPM Medical Group, Inc., Walnut Creek, CA, USA

Jeffrey S. Berger, DO Sports and Spine Rehabilitation Division, Premier Orthopaedic & Sports Medicine, Chadds Ford, PA, USA

Peter G. Campbell, MD Division of Neurosurgery, Parkway Neuroscience and Spine Institute, Hagerstown, MD, USA

Alexios G. Carayannopoulos, DO, MPH Neurosurgery, Comprehensive Spine Center, Brown University Warren Alpert Medical School, Rhode Island Hospital, Providence, RI, USA

Jonathan D. Carlson, MD Interventional Pain, Pain Doctor, LLC, Midwestern Medical School, Glendale, AZ, USA

Ronil V. Chandra, MBBS, MMed, FRANZCR Monash Imaging, Monash Health, Clayton, Melbourne, VIC, Australia

Department of Surgery, Monash University, Melbourne, VIC, Australia

Timothy T. Davis, MD Orthopedic Pain Specialists, Santa Monica, CA, USA

Timothy R. Deer, MD Center for Pain Relief, Inc., Charleston, WV, USA

Steven M. Falowski, MD Neurosurgery, St. Luke's University Health Network, Bethlehem, PA, USA

Daniel A. Fung, MD Orthopedic Pain Specialists, Santa Monica, CA, USA

George M. Ghobrial, MD Department of Neurological Surgery, Thomas Jefferson University Hospital, Philadelphia, PA, USA

Tony Goldschlager, MBBS, PhD, FRACS Department of Surgery, Monash University, Melbourne, VIC, Australia

Department of Neurosurgery, Monash Health, Clayton, Melbourne, VIC, Australia

James S. Harrop, MD Department of Neurological Surgery, Thomas Jefferson University Hospital, Philadelphia, PA, USA

Salim M. Hayek, MD, PhD Department of Anesthesiology, Division of Pain Medicine, Case Western Reserve University, University Hospitals Case Medical Center, Cleveland, OH, USA

Joshua A. Hirsch, MD, FACR, FSIR NeuroInterventional Program, Massachusetts General Hospital, Harvard Medical School, Boston, MA, USA

Bryan C. Hoelzer, MD Anesthesiology and Pain Medicine, Mayo Clinic, Rochester, MN, USA

Chong H. Kim, MD Neurosurgery, Division of Pain Management, Health Sciences Center, West Virginia University, Morgantown, WV, USA

Melinda M. Lawrence, MD Department of Anesthesiology, Division of Pain Medicine, Case Western Reserve University, University Hospitals Case Medical Center, Cleveland, OH, USA

Thabele M. Leslie-Mazwi, MD NeuroInterventional Program, Massachusetts General Hospital, Harvard Medical School, Boston, MA, USA

W. Porter McRoberts, MD Interventional Spine and Pain Medicine, Neurosurgery, Holy Cross Hospital, Fort Lauderdale, FL, USA

Jonathan P. Miller, MD, FAANS, FACS Functional and Restorative Neurosurgery Center, University Hospital Case Medical Center, Cleveland, OH, USA

Neurological Surgery, Case Western Reserve University School of Medicine, Cleveland, OH, USA

Joshua Peloquin, DO Midwestern Medical School, Internal Medicine Intern, Placentia, CA, USA

Julie G. Pilitsis, MD, PhD AMC Neurosurgery Group, Albany Medical College, Albany, NY, USA

Jason E. Pope, MD, DABPM, FIPP Summit Pain Alliance, Santa Rosa, CA, USA

William S. Rosenberg, MD, FAANS Center for the Relief of Pain, Midwest Neuroscience Institute, Kansas City, MO, USA

Joshua M. Rosenow, MD, FAANS, FACS Departments of Neurosurgery, Neurology and Physical Medicine and Rehabilitation, Northwestern University Feinberg School of Medicine, Chicago, IL, USA

Aleka Scoco, BA Case Western Reserve University School of Medicine, Cleveland, OH, USA

Konstantin V. Slavin, MD Department of Neurosurgery, University of Illinois at Chicago, Chicago, IL, USA

Heather C. Smith, BA AMC Neurosurgery Group, Albany Medical College, Albany, NY, USA

Jennifer A. Sweet, MD Functional and Restorative Neurosurgery Center, University Hospital Case Medical Center, Cleveland, OH, USA

Neurological Surgery, Case Western Reserve University School of Medicine, Cleveland, OH, USA

Alexander Vaccaro, MD, PhD Department of Orthopedic Surgery, The Rothman Institute, Philadelphia, PA, USA

Dali Yin, MD, PhD Functional Neurosurgery, University of Illinois at Chicago, Chicago, IL, USA

Youngwon Youn, BA AMC Neurosurgery Group, Albany Medical College, Albany, NY, USA

Part I
Identification and Management of Pain Patients

Chapter 1
Identification of the Pain Patient

Alexios G. Carayannopoulos

Key Points

- It is well established that chronic pain is undertreated and that earlier multidisciplinary pain management intervention may lead to better clinical outcomes.
- Appropriate initial clinical triage should be followed by ongoing clinical reassessment, which should be coordinated across the medical, interventional, and surgical domains. This fosters communication between patients and providers, to ensure that patients are maintaining satisfactory gains in meeting their goals.
- Clinical practice guidelines are essential tools to help guide the treatment of pain patients.
- Because psychological disorders and social influences affect outcomes of patients with chronic low pain, psychological screening and identification of social influences are very important to understand in treating the pain patient.
- A high prevalence of failed back surgery syndrome approaching 40 % suggests that a multidisciplinary approach may be needed to triage candidates appropriately to targeted surgical and nonsurgical pain treatments.

A.G. Carayannopoulos, D.O., M.P.H. (✉)
Neurosurgery, Comprehensive Spine Center, Brown University Warren Alpert Medical School, Rhode Island Hospital, Providence, RI 02903, USA
e-mail: acarayannopoulos@lifespan.org

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Introduction

Spine cases are some of the most common surgeries performed by neurosurgeons and orthopedic surgeons in the USA. Based on the literature, 40 % of patients will suffer from chronic pain following a spinal surgery. It is well established that chronic pain is undertreated and that earlier pain management intervention may lead to better clinical outcomes. Paradoxically, many spine surgeons are unaware of the extent of pain therapies available outside of surgery, nor how to engage patients in a multimodal, multidisciplinary, comprehensive, combined surgical and nonsurgical treatment paradigm. As one of this book's goals is to educate spine surgeons on comprehensive care, the first chapter of this book focuses on "identification of the pain patient," which is the first essential step in successfully engaging the spine patient into this treatment paradigm. Identification of the pain patient requires recognition of a patient suffering from spine-related pain early on. Because spine pain is often accompanied by loss of function and quality of life, earlier recognition and intervention will not only lead to a better clinical outcome but may also prevent disability.

Identification of the pain patient can be done through a multitude of approaches, some of which have been validated through clinical studies, others of which are more anecdotal and have been passed down through generations of spine care, based upon collective years of experience. From the provider's perspective, the goal is to identify patients with spine pain, make an appropriate diagnosis, and then triage the patient into the most appropriate treatment. From the patient's perspective, the goal is to provide the patient with an opportunity to share in the decision-making process with his/her provider in order to achieve the best outcome based upon individualized functional goals. Generally, commonalities of both perspectives include decreased pain, increased function, and enhanced level of satisfaction. Ultimately, working towards these goals together will lead to the best clinical outcome.

Initial Evaluation

The first step in identifying the pain patient begins with clinical triage. Generally, triage is best facilitated by direct communication between two providers. Ideally, clinical triage should route patients to the appropriate surgical or nonsurgical provider and begins with initial assessment of symptoms, general review of treatment objectives, and early identification of red flags to best direct care. In the spine world, red flags include signs or symptoms of progressive motor or sensory neurological deficit, bowel/bladder dysfunction, or extreme pain, which is recalcitrant to conservative measures. Thankfully, the majority of spine cases are nonsurgical and can be successfully managed by medical or interventional options. Only patients who are candidates for and who are interested in pursuing surgery should be triaged to a surgical provider.

For continued identification of the pain patient, an appropriate in-person evaluation must then ensue. All initial evaluations begin with a thorough history, which

includes a review of subjective and objective levels of pain and function, review of diagnostic studies, previous interventions, and previous responses to treatment. This is followed by a focused physical examination. Only after careful correlation of subjective and objective findings should attempts be made at an overall assessment, which includes a clinical diagnosis as well as a functional status. Finally a treatment plan, including education, and need for medical, interventional, or surgical options, is created based upon a patient's individualized treatment objectives.

Although patients' goals are often unique, most goals imply a reduction of pain to facilitate an increase in function. Continued clinical reassessment, which is coordinated across the medical, interventional, and surgical domains by a robust triage system, allows ongoing communication between patients and providers to ensure that patients are maintaining satisfactory gains in meeting their goals.

Use of Outcome Measures

Because the treatment of spine-related pain is challenging, in part due to the subjectivity of pain, early use of standardized outcome assessment tools is essential in identifying the pain patient. Assessment tools should include both subjective measurements of pain and psychological distress, as well as objective measurements of function. Baseline testing establishes a reference point, from which patients' pain and function levels are monitored longitudinally. Graphical displays outlining trends can be used to educate, encourage, and reassure patients. Additionally, these data points are helpful to validate progress for insurance companies, as they highlight progression through the treatment paradigm.

There are a number of outcome tools that reflect different domains important in spine care, which can be used to identify the pain patient. These measures assess pain, physical/psychosocial function, and quality of life (see Table 1.1). Furthermore, they can be subdivided into objective measures and preference-based measures

Table 1.1 Assessment tools

Pain	Numeric Pain Rating Scale (NPRS) Brief Pain Inventory (BPI) Pain Disability Index (PDI) McGill Pain Questionnaire Visual Analogue Scale (VAS)
Physical function	Owestry Disability Index (ODI) Roland Morris Disability Index Range of motion (ROM)
Psychosocial function	Fear Avoidance Beliefs Questionnaire Tampa Scale for Kinesiophobia Beck Depression Inventory (BDI)
Quality of life	Short Form 36 (SF36) Nottingham Health Profile (NHP) Short Form 12 (SF12) Sickness Impact Profile (SIP)

Table 1.2 Subdivided tools

Objective based	• Work status/return to work • Complications or adverse events • Medications used
Preference based	• European Quality of Life (EQ5D) • Short Form 6 (SF6)

(see Table 1.2) [1]. The choice of outcome measure can be daunting. Of the different domains generally assessed, it is felt that pain, function, and quality of life are the most important for identification of the pain patient in both the clinical and research setting. If cost utilization is important, preference-based measures should be used over objective measures.

In summary, for identification of the pain patient, it has consistently been recommended to use both VAS and NRPS secondary to responsiveness and ease of use. For assessment of function, the ODI and RMDQ are recommended. For quality of life, the SF36 and its shorter versions should be used. If cost is important, the EQ5D or SF6 should be used. Psychosocial tools should be used as screening tools prior to surgery because of their inherent lack of responsiveness. Complications should be assessed as a standard of clinical practice. Return to work and medication are not recommended unless these specific questions are being asked. Finally, in deciding on which measures to use, it is suggested that burden in administration to both staff and patients be considered [1].

Multidisciplinary Care

After careful assessment and development of a treatment plan, identified pain patients should be engaged into a multimodal, multidisciplinary treatment paradigm. Historically, the origin of the multidisciplinary approach in the treatment of pain is the legacy of John Bonica, MD, an anesthesiologist and one of the pioneers of pain medicine. Today, the multidisciplinary approach prevails. In fact, use of an independent multidisciplinary assessment for treatment planning, including extensive intake evaluation by a team of therapists, counselors, and a physician, with subsequent generation of a comprehensive report, has been studied and found to provide a potentially reproducible standard for both research and clinical use [2].

Multidisciplinary care includes a continuum of medication management, rehabilitation (physical, occupational, vocational), interventional treatments, psychological co-management, complementary and alternative options, and of course surgical management of pain. After appropriate triage, evaluation, and assessment, placement of the identified pain patient into the appropriate treatment algorithm is guided by a number of tools, as well as their previous treatment history within the multidisciplinary approach.

Clinical Practice Guidelines

Clinical practice guidelines are another essential tool to guide treatment of the identified pain patient. These guidelines present statements of best practice, which are based upon careful and exhaustive assessment of the available evidence from published studies on the outcomes of different treatment options. In November 1989, Congress mandated the creation of the Agency for Healthcare Policy and Research (AHCPR). This organization was given broad responsibility to support research, data development, and related activities. In conjunction with this mandate, the National Academy of Sciences published a document indicating that guidelines were expected to improve the quality, appropriateness, and effectiveness of health care services.

Of the different societies promulgating guidelines, some are more medical, some more interventional, and others more surgical. Examples of each include the American Pain Society (APS) in conjunction with the American College of Physicians (ACP), the American Society of Interventional Pain Physicians (ASIPP), and the North American Spine Society (NASS), respectively. As various society recommendations reflect upon variable vested interests, education, through the use of shared decision, is essential to navigate the various guidelines. Shared decision making helps the patient to negotiate through the different medical, interventional, and surgical treatment options to make an autonomous and informed decision best individualized to meet his/her personal functional goals.

One specific set of medical guidelines by the APS/ACP stands out among these classification systems, which is summarized in the following bulleted recommendations:

- Recommendation 1: Clinicians should conduct a focused history and physical examination to place patients with low back pain into one of the three broad categories including nonspecific low back pain, back pain associated with spinal stenosis or radiculopathy, or back pain associated with another specific spinal etiology.
- Recommendation 2: Clinicians should not routinely obtain imaging or diagnostic studies in patients with nonspecific low back pain.
- Recommendation 3: Clinicians should routinely perform diagnostic imaging and testing for patients with low back pain when severe or progressive neurologic deficits are present or when serious underlying conditions are suspected on the basis of history and physical examination.
- Recommendation 4: Clinicians should evaluate patients with persistent low back pain and signs or symptoms of radiculopathy or spinal stenosis, only if they are potential candidates for surgery or interventional spine treatments.
- Recommendation 5: Clinicians should provide patients with evidence-based information on low back pain with regard to their expected clinical course, advise patients to remain active, and provide self-care options.
- Recommendation 6: For patients with low back pain, clinicians should consider the use of medications, which have proven benefits, in conjunction with back care information and self-care.

- Recommendation 7: For patients who do not improve with self-care options, clinicians should consider the addition of non-pharmacologic therapy, which has proven benefits for acute low back pain, including spinal manipulation. For chronic or subacute low back pain, clinicians should consider including intensive interdisciplinary rehabilitation, exercise therapy, acupuncture, massage therapy, spinal manipulation, yoga, cognitive-behavioral therapy, or progressive relaxation [3].

Because there are a number of clinical practice guidelines for low back pain, which have been characterized by inconsistencies and multiple conflicts in terminology and technique leading to significant diversity in their approach, it is sometimes difficult to implement and adhere to any single guideline consistently [4, 5]. Furthermore, although evidence-based guidelines for evaluation and treatment of chronic low back pain have revealed consistent recommendations and guidance for the *evaluation* of low back pain, unfortunately, there are inconsistent recommendations and guidance for the *treatment* of low back pain. Overall, it is essential to emphasize that clinical guidelines do not represent a "standard of care."

Evidence-based medicine emphasizes the need for rigorous critical appraisals of the scientific literature to inform medical decision making and places strong emphasis on the requirement for valid studies, particularly randomized controlled trials to appropriately evaluate the effectiveness of health care interventions. There is widespread evidence that following evidence-based practice, including clinical practice guidelines, will improve patient outcomes with low back pain and will reduce anecdotal variations in care [6].

Psychosocial Stratification

Because psychological disorders and social influences affect outcomes of patients with chronic low pain, psychological screening and identification of social influences are very important to assess. Understanding of these domains can guide placement of the identified pain patient into appropriate treatment. For example, patients with higher scores on depression and neuroticism scales generally respond more favorably to conservative management over surgery, although the evidence is weak [7]. Likewise, patients with degenerative disc disease (DDD) and a personality disorder respond more favorably to conservative management over patients with DDD without a personality disorder, who respond more favorably to fusion.

Sociodemographic factors should be considered when identifying pain patients and making treatment decisions. Important risk factors include smoking, social support, education level, and job satisfaction. Although these factors alone do not preclude specific treatments, they should be taken into consideration when implementing treatment [8]. Overall, use of a validated psychological screening tool can be helpful in stratifying the identified pain patient, although the evidence is weak.

Procedure-Specific Identification

There are general and treatment-specific clinical practice guidelines for the treatment of chronic non-radicular low back pain. In part, this has arisen because the treatment of DDD with lumbar arthrodesis has risen fourfold in the last several decades. This has led to rise in health care costs, which in turn have increased the prevalence of clinical and payer guidelines, which have had a direct influence on patient and provider treatment options. The availability of evidence-based practices frequently dictates patients' care, often above the autonomous decision of the surgical provider. Because of concerns over efficacy and the direct and indirect costs of surgical treatment with low back pain, surgical spinal fusion in particular has come under increased scrutiny [9].

Several studies have sought to look at efficacy of spinal fusion versus efficacy of conservative treatment measures. It is unclear from the literature which patients with chronic low back pain without neurological impairment are the best candidates for fusion versus conservative management. However, it has been shown that nonsmokers are more likely to have a favorable surgical outcome, while patients with medical comorbidities have a less favorable outcome. Additionally, it has been well established that the success of patients who have had previous spinal surgery having success with repeated spinal surgeries is marginal, at best. Furthermore, interventional spine therapies can achieve higher success rates in the subclass of patients with failed back surgery syndrome (FBSS), with class 1 evidence now demonstrating that spinal cord stimulation is significantly more successful than repeated operations, by multiple outcome measures, in carefully screened and selected patients with FBSS [10]. In fact, SCS was both less expensive than re-operation and economically denominate in terms of cost-effectiveness and cost utility [11].

Summary

Identification of the pain patient is the first step in comprehensive spine care. This is initiated through clinical triage and is continued throughout the multidisciplinary treatment paradigm. Appropriate medical, interventional, and surgical assessment should be balanced with the use of standardized outcome tools to assess baseline levels of pain and function, which are monitored throughout treatment. The identified pain patient is placed into an appropriate treatment plan taking into account their position in the algorithm, which is primarily guided by clinical practice guidelines and secondarily by consideration of psychosocial variables and specific treatment concerns.

Although tremendous variabilities exist in the identification of the pain patient, it has become evident that use of a multidisciplinary approach prevents sliding into the "one-size-fits-all" paradigm commonly seen in the tool bag of medical providers. Surgeons and medical/interventional pain physicians can work in tandem to identify patients in pain early on, to be able to consistently offer therapeutic options that span multiple specialties. Physician awareness is key, and education is paramount.

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Chapter 2
Role of Spinal Surgery in Pain Management

George M. Ghobrial, Alexander Vaccaro, and James S. Harrop

Key Points

- The most common pathologies addressed with spinal surgery are compressive in etiology, and the goal of surgery is decompression of the neural elements.
- Neuropathic pain is complex, often encountered with dysesthetic pain and allodynia. This is indicative of pathology of the central or peripheral nervous tissue, or both.
- While radicular and claudicant-type symptoms are most often associated with compressive lesions of a peripheral nerve, the origin of axial back pain can be multifactorial, which necessitates appropriate work-up.
- Spinal decompression and stabilization are unlikely to adequately relieve neuropathic pain symptoms.
- A high prevalence of failed back surgery syndrome approaching 40 % suggests that a multidisciplinary approach may be needed to triage candidates appropriately to targeted surgical and nonsurgical pain treatments.

G.M. Ghobrial, M.D.
Department of Neurological Surgery, Thomas Jefferson University Hospital,
909 Walnut Street, 3rd Floor, Philadelphia, PA 19107, USA
e-mail: georgeghobrial@gmail.com

A. Vaccaro, M.D., Ph.D.
Department of Orthopedic Surgery, The Rothman Institute,
Philadelphia, PA 19107, USA

J.S. Harrop, M.D. (✉)
Department of Neurological Surgery, Thomas Jefferson University Hospital,
909 Walnut Street, 2nd Floor, COB Bldg., Philadelphia, PA 19107, USA
e-mail: james.harrop@jefferson.edu

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Introduction

Back pain due to spinal etiologies accounts for the second most common reason for a patient consultation in the primary care setting [1]. Furthermore, while most back pain is transient, and the time course is self-limiting, the estimated lifetime prevalence of low back pain (LBP) is estimated to be greater than 90 %, which means that nearly all patients will suffer from this ailment at some point in their lives leading to medical consultation [2]. The prevalence and incidence of chronic back pain are even less well understood, in part due to the lack of agreement on the minimum duration of pain that is required in order to meet the definition of chronic pain—often in as few as 7 weeks. The most general definition of chronic pain is where the pain persists beyond the expected time period for a given pathology.

For most patients, symptoms subside after the first-time onset. For the less fortunate, LBP persists after a trial of analgesic medication, and physical therapy, leading to consultation with a spine specialist. Further complicating spinal pain is the large number of patients thought to seek treatment for chronic LBP due to psychiatric, work-related/socioeconomic, or any kind of secondary gain issue [1]. Regardless of the stated reason, longitudinal studies link chronic spinal pain with depression and disability [2, 3]. Obtaining a proper diagnosis of spinal pain is difficult, and requires a careful history from the patient.

As highlighted in Chap. 1, "Identification of Pain Patients," the efficient design of the neurologic or orthopedic surgery practice in patient selection is to maximize appropriate candidates for surgical treatment. Often, those that are given an appointment with a spine surgeon have undergone evaluation by a primary care doctor or clinician with painful symptomatology and have obtained diagnostic imaging suggestive of a corresponding compressive lesion. The authors will highlight in this chapter that not all of these patients may require surgical decompression for neural compromise. Evidence of the complexity of pain generators that are initially overlooked and do not respond to surgical decompression alone is illustrated by the high prevalence of failed back syndrome (FBSS).

As a result, appropriate triage in the spinal practice is needed to ensure that patients with chronic pain without neural element compression may need one or more less invasive alternative interventional and nonsurgical techniques that will be outlined later in this chapter and in more detail in subsequent chapters.

Identification

The most basic definition of FBSS has been the persistence of LBP following spinal surgery [4]. An argument can be made that the higher the percentage of FBSS in a particular clinic, the more the surgeons should be asking themselves if they have appropriately identified candidates for decompressive surgery or adequately exhausted interventional pain management options prior to surgery. Further

confounding the issue is the dynamic nature of overstimulation of preoperative nociceptive pathways that may result in a shift of pain generators from the acute pathology to chronic pain. This too can lead to an elevated rate of FBSS.

Nonoperative Measures

A complete in-depth discussion of the various nonsurgical treatment modalities can be found in the subsequent chapters of this book. Overall, the predictors of success for nonsurgical therapies for LBP are not well understood [5, 6]. This is not surprising for many reasons. In the literature, there is a paucity of placebo-controlled randomized studies. When analyzing the prospective studies, the most obvious difficulty in generalization across studies is the lack of standardization of selection criteria, definitions of pain, and validated objective outcome measures for pain. The criteria for diagnosis and inclusion in most studies for facet and epidural injection differ, as well as the criteria for success ranging from 50 % or greater. Chapters 12, 13, and 14 will discuss in more detail the specifics of interventional, neuromodulation, and intrathecal drug therapies available for the nonsurgical treatment of LBP, respectively. However, the authors will highlight below some key points regarding patient selection and nonsurgical treatment of LBP below.

Facet Blocks

One common contributor to axial back pain LBP is facet arthropathy. The facet joints are richly innervated by a dual innervation of somatic, nociceptive, and autonomic pain fibers. Therefore, somatic fibers at each facet level are responsible for characteristically localized pain in tandem with referred pain due to a convergence of pathways with autonomic fibers either in the dorsal horns or thalamus in the second- or third-order ascending pathways, respectively [7]. It is important to consider facet arthropathy as a source of pain, particularly in the setting of axial LBP, without radicular symptoms. The diagnosis of facet joint pain is typically made by an interventional facet nerve block yielding symptomatic relief of LBP in the absence of radiculopathy [8]. Facet pain has been shown in studies by Manchikanti and colleagues to have a prevalence ranging from 20 to 40 % of all LBP [8–15]. There are no class A recommendations for the management of "facet-joint"-type pain. Instead, level II evidence supporting lumbar facet joint nerve blocks [8, 16, 17] and radiofrequency neurotomy [18, 19] has been previously published supporting these modalities of pain mediation. Furthermore, only level III evidence exists in support of intraarticular corticosteroid injections for chronic LBP