Groin pain in adults

A practical approach to a complex problem

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Groin pain is a common but diagnostically complex presentation, with a wide range of musculoskeletal and nonmusculoskeletal causes. Although a specific diagnosis is important in selected cases, it may not alter management in many patients. Load management remains the cornerstone of treatment, and investigations such as x-ray, ultrasound and MRI are rarely required first line but should be considered when symptoms fail to improve with initial conservative management.

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The groin is one of the most diagnostically complex regions in musculoskeletal medicine, with a broad range of potential causes of pain.[1] There is also ongoing uncertainty about whether establishing a specific anatomical diagnosis changes management in the majority of cases. The value of a specific diagnosis is often clearer in mid- to distal-limb musculoskeletal conditions. By contrast, in adult back pain, there is increasing recognition that best-practice management is frequently independent of anatomical diagnosis.[2-4] Groin pain, with the hip joint casting a large diagnostic shadow, lies somewhere between these examples. Some presentations have important specific diagnoses, such as hip osteoarthritis in the older adult, whereas many others are best managed using broader principles similar to those used in back pain.

Traditionally, clinicians are trained to approach musculoskeletal presentations through history taking, followed by physical examination and then special investigations. In sport and exercise medicine, investigations may include imaging, pathology and, increasingly, data from wearable devices.[5] These components form part of the diagnosis, which then informs management. First-line management usually involves lifestyle measures and simple medications, with injections and surgery reserved for selected cases. There is increasing recognition that lifestyle and noninvasive strategies are underused, whereas medications and surgery are often overused in musculoskeletal medicine.[6]

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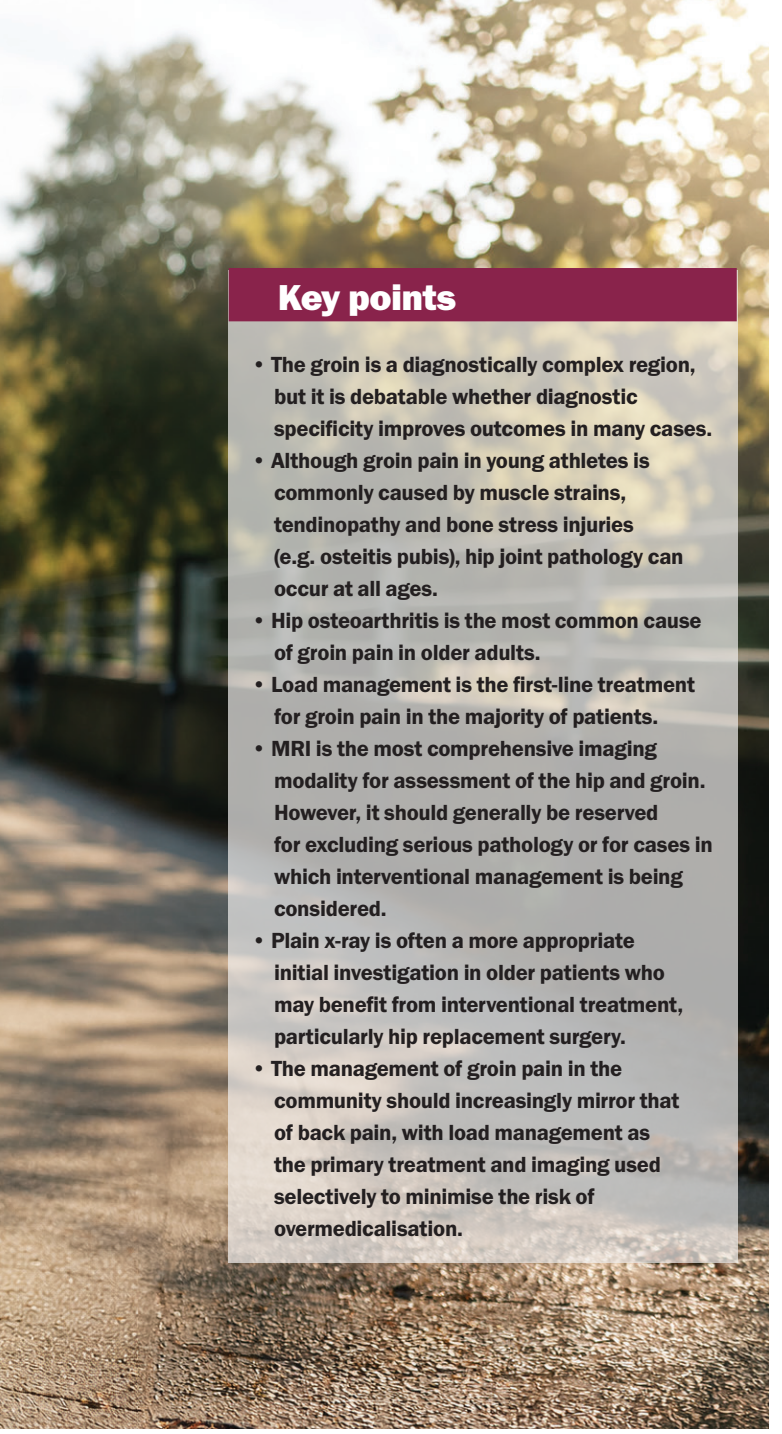


Key points

- The groin is a diagnostically complex region, but it is debatable whether diagnostic specificity improves outcomes in many cases.
- Although groin pain in young athletes is commonly caused by muscle strains, tendinopathy and bone stress injuries (e.g. osteitis pubis), hip joint pathology can occur at all ages.
- Hip osteoarthritis is the most common cause of groin pain in older adults.
- Load management is the first-line treatment for groin pain in the majority of patients.
- MRI is the most comprehensive imaging modality for assessment of the hip and groin. However, it should generally be reserved for excluding serious pathology or for cases in which interventional management is being considered.
- Plain x-ray is often a more appropriate initial investigation in older patients who may benefit from interventional treatment, particularly hip replacement surgery.
- The management of groin pain in the community should increasingly mirror that of back pain, with load management as the primary treatment and imaging used selectively to minimise the risk of overmedicalisation.

History and initial assessment

Even in the era of readily accessible MRI, history-taking remains the most important part of assessment and should take priority. Important questions include whether the primary symptom is pain or another symptom such as swelling, numbness or weakness, and whether symptoms are associated with urinary, gastrointestinal or gynaecological complaints.

With respect to pain, clinicians should determine:

- whether symptoms relate to sport, exercise or musculoskeletal loading
- whether activity is limited by symptoms
- symptom duration and temporal pattern
- whether symptoms fluctuate with changes in load
- whether onset was sudden or gradual
- whether the patient has continued activity despite pain.

The history is often the most important clue as to whether groin pain symptoms arise from the musculoskeletal system or represent referred pain from another organ system.

There is a small but important overlap with potentially serious diagnoses, including testicular cancer in young men, prostate cancer in older men, gynaecological cancer in women, and more severe musculoskeletal diagnoses, such as hip osteonecrosis, strangulated hernia and femoral neck stress fracture.

Typical musculoskeletal pain will be worse with activity and temporarily improved by rest. Symptoms usually have either an obvious association with loading (e.g. sudden onset during sport) or a more subtle association, such as gradual onset after increased walking or lifting. Important musculoskeletal and nonmusculoskeletal differential diagnoses are summarised in the Table.

Rethinking the traditional diagnostic approach

Traditional teaching suggests that physical examination follows the history and helps formulate a differential diagnosis. However, given the large number of possible diagnoses and examination tests, it may be more practical to begin considering management strategies based on the history before progressing to examination and investigations.

In selected cases, genital examination is appropriate, but this may also represent an unnecessary invasion of privacy in low-yield situations.[7] Clinicians should therefore ask whether an examination or investigation is likely to alter management meaningfully. Where intimate examination is indicated, a chaperone should be offered.

Physical examination and imaging remain important parts of assessment but should be directed towards likely diagnoses and management options.

Management options for groin pain

Load management

The initial management of most musculoskeletal conditions is conservative. The term load management best describes high-quality conservative management.

Although randomised controlled trials have examined conservative management programs for groin pain, such as exercise programs, load management usually needs to be individualised.[8,9] Studies in elite athletes have shown that constant moderate loading is protective against injury, whereas sudden increases in load increase injury risk.[10-12] These findings have influenced modern rehabilitation approaches, where injury management typically involves an initial unload period followed by gradual, progressive reloading. Ideally, rehabilitation programs for community athletes and nonathletes should follow the same principles. This underpins physiotherapy exercise programs that gradually increase repetitions and resistance.[13]

In some cases, however, patients report worsening pain with prescribed exercises. This should be interpreted in the context of total load. If occupational, household or sporting load remains

Table. Common and important differential diagnoses in groin pain

	Young adults (including athletes)	Older adults
Most common conditions	• Muscle strains • Adductor tendinopathy or osteitis pubis	• Hip osteoarthritis (pain localisation is often vague) • Gluteal insertional tendinopathy, including trochanteric bursitis with lateral hip pain
Less common conditions	• Femoroacetabular impingement and other early hip degenerative conditions • Genitourinary conditions (e.g. urinary tract infection, endometriosis)	• Hernias • Polymyalgia rheumatica • Prostate cancer (in older men) • Referred lumbar spine pain to the groin region
Rare but important conditions	• Stress fractures, particularly involving the upper femur, pelvis or femoral neck • Lumbosacral stress fracture with groin referral • Nonmusculoskeletal malignancy (e.g. testicular cancer) • Enlarged inguinal lymph nodes secondary to distal pathology	• Other severe conditions, including malignancy and pathological fracture

unchanged, then additional exercises may simply increase overall loading.

Total groin load may include:

- occupational activity
- household tasks
- sport and leisure activity
- rehabilitation exercises
- Pilates or yoga.

Loading is the most beneficial when it follows a period of unloading and then progresses gradually. Physiotherapy-prescribed exercises are therefore best viewed as one component of a broader, graded loading strategy.

The ideal de-load and re-load program is graduated and progresses slowly enough to avoid reinjury (Figure 1a; Goldilocks or tortoise pattern). Common patterns of unsuccessful reloading after injury are shown in Figures 1b, 1c and 1d (hare, mule and sloth patterns). These analogies can help explain to patients why deviation from the ideal program may lead to lower success rates. The tortoise versus hare analogy helps explain why slower rehabilitation is often associated with greater success and lower recurrence rates than more rapid rehabilitation. Successful rehabilitation, with sufficient progression to allow for restrengthening, can be considered to occur within the Goldilocks zone (not too high or fast and not too low or slow). Unsuccessful rehabilitation may occur if baseline load does not decrease sufficiently (the mule pattern; Figure 1c) or if loading remains too low for too long and is not sufficiently challenging (the sloth pattern; Figure 1d). In chronic pain presentations, where patients may have experienced many months or years of unsuccessful conservative treatment, it is not uncommon for management to begin with a mule pattern (persisting through pain for too long) followed by overcorrection into a sloth pattern (physical activity avoidance because of fear of pain).

Load (the y-axis) can be relatively easy to calculate in unidirectional athletes, such as runners, swimmers, cyclists and bushwalkers, where weekly distance or daily step counts can be measured objectively.[5] However, straight-line running, change of direction, lifting and core work (e.g. rehabilitation exercises, Pilates and yoga) all contribute to groin loading, making total load more difficult to quantify objectively.

Physiotherapists are traditionally the main practitioners involved in prescribing load management programs for musculoskeletal conditions such as groin pain. Other allied healthcare practitioners, including chiropractors, osteopaths and exercise physiologists, may also have expertise in load management. For active individuals, sport and exercise medicine physicians are often the most appropriate specialist referral, whereas occupational physicians and rehabilitation physicians may be more appropriate in their respective contexts.

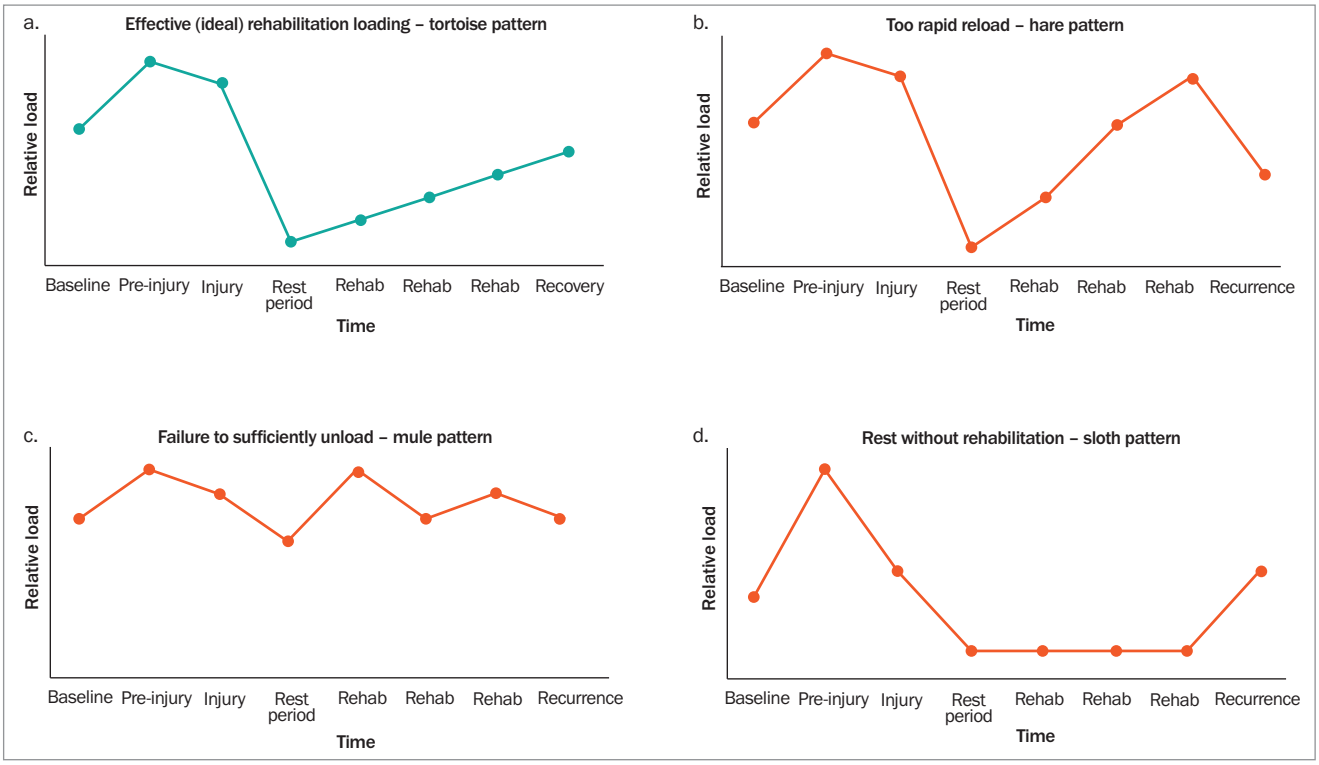
Corticosteroid injections and pain-relieving medications

Corticosteroid injections and analgesics may provide short-term symptom relief in groin pain, as they do in other musculoskeletal conditions.

For corticosteroid injections, evidence suggests greater pain relief than placebo during the first two to eight weeks after injection.[14,15] However, this benefit may be offset by worse medium-term outcomes. When short-term improvement is especially important, such as during a sporting competition, the benefits may outweigh the risks.

The precise injection site may also be less important than previously assumed. For example, intramuscular gluteal corticosteroid injections may provide short-term pain relief in hip osteoarthritis.[16]

If analgesics are used, paracetamol and NSAIDs are generally preferred to opioid analgesics because of their more favourable adverse-effect profile. Analgesics may reduce pain but generally do not address the underlying cause and may interfere with optimal load management. Analgesics are therefore helpful in the short term but may be unhelpful or even harmful in the medium term. By contrast, exercise may temporarily increase symptoms related to the activity in the short term but likely help build resilience in the long term.



Figures 1a to d. Common patterns of successful and unsuccessful reloading after injury. (a, top left) Successful rehabilitation in the Goldilocks zone (the tortoise pattern). (b, top right) Unsuccessful rehabilitation due to rapid attempted return (the hare pattern). (c, bottom left) Unsuccessful rehabilitation due to excessive ongoing load (the mule pattern). (d, bottom right) Unsuccessful rehabilitation due to lack of sufficient loading in a rest phase (the sloth pattern).

Hip replacement surgery

Pain arising from the hip joint does not localise well and therefore groin pain, particularly in an older adult, may reasonably be caused by hip osteoarthritis. Of the musculoskeletal surgeries performed in this region, hip replacement has the strongest evidence base. High-quality controlled trials now confirm the net benefit of hip replacement, and registry data from multiple countries provide reassurance regarding the overall safety of the procedure.[17-20] Hip replacement has also been associated with improved life expectancy in the decade after surgery compared with matched patients with osteoarthritis managed conservatively, likely because of improved exercise capacity and reduced reliance on analgesics.[21] Compared with arthroplasty in other joints, some patients are able to return to high levels of sporting function after hip replacement. However, the long-term prognosis beyond 15 years remains uncertain in younger patients, and any life expectancy gains may diminish over time.[21,22]

Glucagon-like peptide-1 receptor agonists in overweight patients

Traditionally, weight loss has been an important consideration in overweight patients with lower-limb conditions, although this advice has often been given with the acknowledgement that sustained weight loss is difficult in injured patients with exercise limitations. If weight loss can be achieved through dietary modification and nonweightbearing exercise, these remain ideal first-line management approaches. Currently, there are no specific trials evaluating glucagon-like peptide-1 (GLP-1) receptor agonists for groin pain. However, there is increasing interest in their use as a treatment option for other lower-limb pain conditions in people with overweight or obesity.

It has long been recognised that the prognosis for lower-limb pain conditions is generally worse in overweight individuals. Groin-related conditions associated with excess body weight include lateral femoral cutaneous nerve entrapment, hip osteoarthritis and inguinal hernia.[23-25] In hindsight, now that GLP-1 receptor agonists are available, the relationship between body weight and lower-limb pathology appears more obvious. Historically, overweight patients were often advised to temporarily reduce exercise levels to allow injury recovery while simultaneously being encouraged to lose weight to address an important risk factor. Prior to the GLP-1 receptor agonist era, intensive exercise combined with dietary modification was generally considered essential for both achieving and maintaining weight loss.[26]

There is now prospective randomised evidence supporting the use of GLP-1 receptor agonists in obese patients with knee osteoarthritis.[27] Retrospective studies have also shown reduced complication rates after hip replacement surgery in patients using GLP-1 receptor agonists, and nonrandomised evidence supports their use in patients with inguinal hernia and plantar fasciitis.[25,28,29] More broadly, when excess body weight contributes to lower-limb pathology, GLP-1

Figure 2. Plain x-ray of the hips showing mild bilateral osteoarthritis.

receptor agonists are now established as an effective weight-loss strategy in many patients.

Other treatment options

Other surgical options for groin pain include repair of sportsman's hernia, adductor tenotomy, debridement of osteitis pubis lesions, iliopsoas bursectomy and hip arthroscopy, including treatment of femoroacetabular impingement.[30-34] Injection-based treatments include platelet-rich plasma, stem-cell therapies, botulinum toxin, prolotherapy and hyaluronan gel injections.[34-36] However, none of these treatments has a particularly strong evidence base and they therefore remain somewhat speculative.

Traditional reviews of groin pain have often included extensive lists of diagnostic and management options, although these may be more confusing than helpful for many patients. Hip arthroscopy modestly outperforms conservative treatment for femoroacetabular impingement, with improvements in pain and reduced progression to joint replacement,[37] although it remains unclear whether this reflects a true therapeutic effect or limitations in the nonblinded trials performed to date. Sportsman's hernia surgery has shown good results in case series, although the overall quality of evidence is low.[38]

In occupational cases, including professional athletes, there may occasionally be justification for speculative injections or surgery where even small functional improvements may be valuable. Whether benefit is achieved through a specific therapeutic effect or more nonspecific mechanisms, such as enforced rest or placebo effect, may be less important from the patient's perspective. However, the wide range of unproven treatment options can be intimidating for both clinicians and patients and should be approached cautiously in the general population.

Similarly, many allied health treatments proposed as alternatives to load management, such as spinal manipulation, massage therapy and dry needling, also have limited evidence bases. Nevertheless, apart from opportunity cost, these treatments are unlikely to cause substantial harm even where benefit may partly reflect placebo effects.

Rheumatologists are the most appropriate specialists when inflammatory arthritis is suspected, orthopaedic surgeons when hip replacement is being considered and general surgeons for macroscopic hernia.

Physical examination

Physical examination retains an important role at the initial consultation but can be tailored to the presenting history and likely direction of management. The most important examination finding is hip range of motion, with attention to any side-to-side asymmetry if pain is unilateral. Well-preserved hip range of motion, particularly internal rotation, external rotation and extension, suggests a hip joint in relatively good condition.

Muscle strains are relatively common injuries in athletes and are characterised by acute onset, local tenderness, weakness, pain on resisted contraction and pain on stretch.[39,40] In men with inguinal pain or awareness of a lump, observation and palpation of the inguinal canal while standing or straining can help assess for macroscopic inguinal hernia. Measurement of muscle strength with a dynamometer, commonly performed by physiotherapists, is also a useful tool for monitoring elite athletes.

Physical examination may occasionally identify nonmusculoskeletal causes of groin pain. Localised groin tenderness with painful lymphadenopathy may suggest a distal source of infection, such as an ingrown toenail. Tinea cruris or folliculitis may also present with groin pain and can be identified on examination. Testicular tumours occasionally present initially with groin or lower abdominal pain before a hard ipsilateral testicular lump is detected by either the patient or clinician.

Investigations

Plain x-ray

The older the patient with groin pain and the more restricted the range of hip motion, particularly internal rotation, the greater the likelihood of hip osteoarthritis and therefore the greater the diagnostic yield of plain x-ray. If pain localisation is vague and onset gradual, hip osteoarthritis may be diagnosed on plain x-ray alone (Figure 2), without the need for further imaging such as MRI.

MRI scan

If imaging is indicated, MRI is now the gold-standard investigation for people with groin pain because it provides excellent assessment of muscles, tendons, bones and joints. MRI also avoids ionising radiation, so any potential harm is more likely to result from inappropriate subsequent management than from the investigation itself.

Other than in very young patients, MRI will frequently demonstrate some abnormality, and the challenge lies in determining the clinical relevance of findings and avoiding the attribution of symptoms to pathology that may lead to unnecessary intervention.[41,42] In this respect, groin pain resembles back pain, where there is concern that MRI may contribute to cascades of medical treatment that do not necessarily improve patient outcomes.[4]

Nearby structures are included within the imaging field; therefore, MRI may occasionally detect valuable incidental findings such as

nonmusculoskeletal malignancy. However, incidental benign findings, particularly in women (e.g. ovarian cysts and fibroids), are also common.

MRI remains particularly valuable in:

- high-level athletes
- workers' compensation cases
- patients with red flags for severe pathology, such as weight loss or a history of malignancy.

Potential benefits of MRI include:

- exclusion of serious pathology, including malignancy, osteonecrosis and femoral neck stress fracture
- assisting with prognosis and estimating timeframe for return to activity, particularly in muscle strains and stress fractures.[43,44]

Imaging is generally less useful in determining prognosis for early degenerative joint disease and tendinopathy.

Dynamic ultrasound

If inguinal or other hernia forms part of the differential diagnosis, ultrasound is useful because it allows for comparison of resting and straining appearances, which MRI cannot provide.

Macroscopic inguinal hernia more commonly presents with an intermittent lump than pain, and surgical repair is generally recommended because of the risk of bowel obstruction.

The so-called sportsman's hernia is a prehernia lesion characterised by weakness of the posterior inguinal wall or widening of the superficial inguinal ring and is associated with chronic groin pain. Despite variable terminology and definitions, conservative treatment is generally recommended initially.[45,46] Surgical repair, performed either laparoscopically or via an open approach, remains a second-line option but lacks a strong evidence base.[38] Unlike macroscopic hernia, these cases should not be assumed to inevitably require surgery.

Conclusion

Although the groin and hip region has considerable diagnostic complexity, there is increasing appreciation, similar to back pain, that much of this complexity may not alter management in many patients. In the majority of community patients, the most appropriate baseline treatment is load management. This generally involves reducing, but not eliminating, total groin load while pain levels are high, followed by gradual reloading as symptoms improve.

Managing load can be challenging because it may arise from occupational, household and leisure activities. Strengthening exercises prescribed by therapists also contribute to loading and are often beneficial, although they may occasionally contribute to overload.

Investigations such as x-ray, ultrasound and MRI are rarely required as first-line investigations but should be considered when symptoms fail to improve with initial unloading and conservative management. **PMT**

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A list of references is included in the online version of this article (www.painmanagementtoday.com.au).

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