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While osteoporosis is usually asymptomatic, it can cause very painful fractures that can take months to heal. In the case of vertebral fractures, acute pain tends to diminish as the fracture heals with time, but in some cases, pain and muscle spasms can last much longer. The affected vertebra retains its crushed shape and can affect nearby muscles, tendons, ligaments and nerves. Chronic pain may result from muscle tension, stiffness, weakness or spasms, lasting beyond the expected time for healing and interfering with normal life. It can diminish a person's quality of life not only physically, but also psychologically and socially.

Since quality of life issues are at the core of successful osteoporosis management, an important part of care focuses on reducing pain and enabling people to accomplish daily tasks more easily. This issue of Osteoporosis Update looks at the impact of pain and fractures on individuals with osteoporosis and gives an overview of pain management techniques. The standard pharmacologic measures include analgesics such as NSAIDs and COX-2 inhibitors, opioids and calcitonin, but surgical options are also available in some instances. As well, your patients might ask about the value of nonpharmacologic options, such as back braces and walking aids, heat and ice, TENS, etc. Since many people resort to complementary therapies to deal with chronic pain, it is worth considering them.

This issue also features a challenging case (page 5) submitted by a reader, in which we investigate several possible diagnoses in a male presenting with sudden and severe pain involving the hip and thigh. Next, in our series on the role of allied health professionals in osteoporosis management (page 9), Sonia Bibershtein, PT, discusses the essential support physiotherapists provide in the rehabilitation and education of patients, either in a large osteoporosis clinic or by referral. And on page 10, Dr. Stephanie Kaiser updates us on the value of statins in lowering vertebral fracture risk.

We hope that you will find this edition of Osteoporosis Update informative and valuable in your daily practice.

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Investigations for transient osteoporosis

“M"y 45-year-old male patient presented with sudden onset of pain in the front of the thigh and side of the hip. The pain, which was not triggered by any apparent injury and has increased gradually over a few months, intensifies with weight-bearing and turning motions. X-ray showed osteoporosis of the femoral head. Is it possible that this might be TOH (transient osteoporosis of the hip)? What causes this condition? How can it be properly diagnosed (bone scans, radiographs, MRI?) and what other conditions, such as arthritis or avascular necrosis, have to be ruled out? What are the best treatment options, and do any long-term preventive measures need to be taken to avoid further development of osteoporosis?”

— a GP in Kelowna, BC

Dr. Wojciech Olszynski comments:

Since this case opens up a wide spectrum of possible diagnoses, a good place to start is to concentrate first on the striking abnormality found from the performed investigations:

- The radiologic description of osteoporosis needs to be verified. In fact, the radiologist should consider the condition osteopenia as long as the diagnosis is not firmly established, since other causes of osteoporosis can produce the same x-ray image suggesting significant bone loss. There are various reasons why normal bone density may appear reduced on a plain radiograph. The impression of reduced bone mass needs to be confirmed by dual energy x-ray absorptiometry (DXA).

- The presence of pain suggests a diagnosis other than osteoporosis. Unless a fracture has occurred, this condition is generally asymptomatic. In some cases, spine disease may be responsible for referring pain down to the hip and even to the whole leg. X-ray of the spine will be advised to further clarify the diagnosis.

- If arthritis was the cause of the pain, it should be recognizable on radiographs and there should be evidence on physical examination of the hip joint. In most cases, one can document pain on movement, particularly involving external and internal rotation.

- The possibility of avascular necrosis (also referred to as osteonecrosis and aseptic necrosis) was mentioned and certainly may present with severe pain, difficulty walking and osteopenic changes on the hip x-ray. The list of different clinical settings associated with this condition is very long and includes truly idiopathic cases with no known causes. The most common ones, however, are related to therapy with high doses of glucocorticoids. MRI is the most conclusive test for diagnosis of this condition, and therapy depends on the stage of the disease. A general term for conditions that include features such as you describe (rapidly developing osteoporosis, absence of clear evidence of trauma or immobilization, self-limiting nature) is transient regional osteoporosis (TRO). TRO can manifest as monoarticular pain with obvious regional osteopenia on plain radiographs. While there is discussion about whether TRO represents a variation of reflex sympathetic dystrophy (RSD, or, according to the Pain Society’s new terminology, chronic regional pain syndrome [CRPS]), neuropathic pain and preceding trauma that may characterize this condition are unusual in TRO. The diagnosis is based on the existence of symptoms of joint pain, decreased joint range of motion and local osteopenia. Skin changes may also be present. Bone scan shows increased uptake in the area involved.

Since TRO is a condition with a variety of presentations, the frequency is not well documented, but it is generally rare and self-limited. It includes conditions that have in common the development of self-limited pain and radiographic osteopenia affecting one or several joints, most commonly the hip. In some cases, especially if related to CRPS, TRO may progress to transient bone marrow edema detected by MRI. Although usually self-limited, some patients may develop ischemic necrosis of the bone.

Treatment of TRO is mainly symptomatic to control pain and avoid weight bearing. Bisphosphonate therapy is successful in some cases of RSD and might perhaps be in TRO, with intravenous pamidronate being the most commonly reported drug used. Review of the literature is inconclusive as to results from this therapy, but the fact that we are dealing with local osteoporosis makes this concept of treatment attractive and worth evaluating further.

So far, there is no evidence that TRO can lead to generalized osteoporosis, although a number of cases in the literature found reduced bone mass in skeletal regions other than the one affected by RSD/TRO.

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The challenge of pain
Strategies for effective relief

Osteoporotic pain can be disabling, lowering both physical functioning and quality of life. Fractures cause acute pain, but also contribute significantly to pain in the longer term. Chronic pain is distinguished from acute pain of fracture by persisting beyond the approximate three-month recovery period, and is not always associated with fractures. Kyphosis causes muscle tension and traction on the ligaments, which can lead to long-term back pain. Additional sources of pain are paraspinal muscle spasm and degenerative arthritis in the region of a fracture.

Vertebral fractures are often asymptomatic — only one in four is actually detected. Even painful fractures can remain undiagnosed, since under 1% of back pain episodes are designated as fracture-related. In a study of older women with osteoporosis that reported a 75% prevalence of back pain, only 13% of the subjects had previously diagnosed vertebral fractures. In this cohort, pain may have been caused by undetected fractures, kyphosis, or other factors unrelated to osteoporosis (such as facet joint disease).

IMPACT OF PAIN AND FRACTURES
Osteoporotic pain — indeed, any impairment of musculoskeletal or neuromuscular systems — negatively affects both balance and functional mobility. Reduced activity, in turn, leads to a further weakening of muscles and increased risk of falls.

Both vertebral and hip fractures are associated with higher morbidity and diminished quality of life. About 75% of patients who present with clinical vertebral fracture will suffer chronic pain. Vertebral fracture increases the number of days spent in bed or in hospital, and restricts physical activity. Decline in overall functioning, especially in older women, includes difficulties with daily actions such as bending, lifting, descending stairs and cooking. A survey of postmenopausal Canadian women with osteoporosis found that health-related quality of life (HRQL) was lower among those who had sustained vertebral fractures, and a similar but less pronounced HRQL decline was noted with nonvertebral fractures, as compared with nonfracture osteoporosis control patients.

DIAGNOSIS
The occurrence of one vertebral fracture predicts a five-fold higher risk of a second event (20% increased risk of a second vertebral fracture within one year) and a 2.8-fold increased risk of subsequent nonvertebral, including hip, fracture. With vertebral fractures often going undetected, it is important to follow up patients’ reports of back pain or discomfort with prompt clinical assessment and treatment.

Radiography is the best tool for diagnosing osteoporotic vertebral fractures. Bone scintigraphy has also been used to detect fractures in patients suffering from back pain. Identification of fractures, together with bone density measurement, can help distinguish back pain due to osteoporosis from other causes (e.g. degenerative disk disease or facet joint lesions).

PAIN MANAGEMENT
Drug therapy is especially useful for acute pain and during the recovery period following a fracture. In the long term, clinicians and patients may also consider nonpharmacologic approaches to chronic pain, which can help restore quality of life while simultaneously reducing patient reliance on medications.
Pharmacotherapy

Analgesics/opioids are the cornerstone of pain management. Short-term bed rest and the use of standard analgesics, such as acetaminophen, codeine, oxycodone and morphine, are the first-line approach for acute pain. While nonsteroidal anti-inflammatory drugs (NSAIDs) appear to be as effective as paracetamol for the treatment of lower back pain, they have been associated with some serious side effects. The newer agents, cyclooxygenase (COX)-2 specific inhibitors or COXIBs, have been shown to provide effective relief of chronic lower back pain, without the degree of gastrointestinal complications commonly attributed to NSAIDs. Some physicians and patients have reservations about using opioids due to concerns about addiction and side effects, such as constipation. Response rates vary, depending on the type of opioid being used, nature of the pain, route of administration and development of drug tolerance.

Calcitonin (CT) is a first-line therapy to treat symptoms of serious pain related to acute vertebral fracture and to facilitate mobility. Salmon calcitonin is available in nasal spray (200 IU/day) or injectable (100 IU/day) form. While there are no published studies on higher doses, the trend is to increase the dosage up to as much as 800 IU/day for nasal calcitonin. Side effects with injectable calcitonin include nausea with or without vomiting in 20-40% of patients, flushing of the face and hands (20-35%), and rash at the injection site (< 10%). Nasal CT, the drug of choice, is associated with minor nasal irritation and bleeding. Serious side effects, such as severe allergic reactions and anaphylaxis, are rare for both formulations.

Nerve root injections of local anesthetics and glucocorticoids are also safe and effective for vertebral fracture pain. Studies looking at the injection of lidocaine with triamcinolone diacetate or with bupivacaine and methylprednisolone acetate into the gray ramus tract of the somatic nerve root reported improved pain scores, up to one-year follow-up, and decreased use of analgesics.

Surgical approaches

Vertebroplasty and kyphoplasty are minimally invasive procedures involving the percutaneous injection of polymethylmethacrylate (PMMA, bone cement) into a fractured vertebral body. Kyphoplasty has the added step of balloon inflation within the collapsed vertebra prior to the injection of PMMA, which serves to restore height and reduce kyphotic deformity. Although both interventions may provide excellent pain relief and improved function after osteoporotic vertebral crush fractures, they are also associated with serious side effects. Vertebroplasty is available in Canada only at specialized centers, and the best candidates appear to be patients with severe, intractable pain with evidence of a new or progressive vertebral compression fracture by conventional radiography and MRI. Kyphoplasty has not been approved for use in Canada.

Treatment issues with elderly patients

Clinicians do not always recognize the existence and extent of pain experienced by elderly patients. A study of nursing home residents showed that physicians prescribed significantly fewer analgesics to cognitively impaired individuals than to their cognitively intact peers. Patients' confusion, dizziness, withdrawal and communication deficits contribute to lower awareness of pain by caregivers. Additionally, nurses often underestimate the severity of pain, as compared to patients' perception.

Though pain tolerance does not increase with age, patients' stoicism and reluctance to report pain may be additional barriers. The consequences of chronic pain experienced by the elderly are impaired social and physical functioning, depression and symptoms of apathy, anorexia and insomnia.

Complicating treatment of older people are features such as slower metabolism and clearance of drugs, decreased organ function and physiologic changes in cardiovascular and respiratory reserves. As well, elderly people take an average of almost eight medications daily, making the possibility of adverse drug interactions high.

Nonpharmacologic options

To augment medications and surgery, other approaches exist to help treat pain, enhance postfracture rehabilitation and prevent falls. The widespread use of complementary therapies by many patients to cope with chronic back pain warrants their consideration:

Physical supports such as back braces prevent further complications, although adherence is an issue. A weighted kypho-orthosis may be more useful and have higher compliance than conventional spinal orthoses. Walking aids can enhance upper body support and lessen back pain caused by paravertebral muscle spasms.

Heat and ice applications are effective for stiff muscles and chronic pain relief. Cold or ice packs reduce swelling and inflammation, and numb nerves to diminish pain sensation. Applications should be limited to 15-20 minutes, and hot or cold packs wrapped in a towel to protect the skin.

Massage therapy can help ease muscle stiffness and increase the local blood supply. Patients with spinal osteoporosis, however, should be cautioned to avoid deep muscle massage in the spinal area. Relaxation training can also be used to release muscle tension and divert attention away from pain.
Exercise

Lack of physical activity due to fracture and associated pain can exacerbate bone loss and raise the risks of subsequent fracture. The goal of exercise for people with osteoporosis is: first, to preserve bone density; second, to enhance balance and flexibility in order to reduce falls and make them less dangerous; and finally (in those with vertebral fractures or kyphosis pain), to strengthen and increase flexibility of paraspinal muscles. Individually tailored programs including progressive muscle strengthening exercises can help to reduce pain.

Physiotherapy has a positive impact on pain and quality of life for osteoporosis patients. One study instituted a 10-week regimen of ambulatory exercises in women experiencing pain in osteoporosis patients. It has been shown to bring relief immediately following and one week after treatment for lower back pain,22 When used to treat postoperative pain, TENS (with optimal pulse frequency of 85 Hz) significantly cut down analgesic consumption by 26.5%.23

Acupuncture stimulates muscle nerve fibers and leads to the release of endorphins. Needleling raises beta-endorphin levels and can alleviate chronic lower back pain significantly, compared to conventional physiotherapy.21, 24 In more than one study, however, “sham” acupuncture (control group) decreased lower back pain (to a lesser or similar extent than true acupuncture), resulting in debate about whether the efficacy of acupuncture is linked to a placebo effect24 or to real afferent stimulation.25

THE GOAL

The ultimate aim of osteoporosis pain management is to improve patients’ quality of life. Reduced pain and increased balance and mobility facilitate resumption of daily activities. Normal physical and social functioning, in turn, can help minimize symptoms of depression and withdrawal, and lead to greater overall satisfaction with life.

References


From prevention to rehabilitation: the physiotherapist’s role

Sonia Biberstein, PT, Multidisciplinary Osteoporosis Program, Sunnybrook and Women’s College Health Sciences Centre, Toronto, ON.

Perspective

Physiotherapy intervention spans the continuum of osteoporosis care, from prevention and education through clinical management and research. Physical therapists are key members of the osteoporosis healthcare team who provide expertise in exercise, physical function and movement. Primary goals are to:

- maximize bone density and minimize bone loss through exercise and active lifestyle
- reduce the risk of falls
- promote correct postural alignment
- offer education on avoiding positions of spinal loading that increase the risk of vertebral compression fractures
- restore physical function following an acute vertebral compression fracture or hip fracture

Prevention and Education

Physiotherapists address preventive strategies with high-risk osteopenic populations, e.g., women with eating disorders or with strong family histories of osteoporosis, or individuals on long-term steroid therapy. Our goals are to help these people accrue and maintain bone density, educate them regarding bone health and promote good posture. A customized exercise prescription is developed based on an assessment of the client’s and therapist’s goals, as well as the individual’s preferences, limiting factors and available exercise facilities/equipment. The program might include weight-bearing activities (racquet sports, fitness classes, fast-paced walking), muscle strengthening with weights, and postural exercises.

Perimenopausal osteoporotic clients can also benefit from physiotherapy interventions. We educate women at high risk of fracture about limiting spinal flexion and rotation movements (these activities increase the risk of sustaining a vertebral compression fracture) during exercise and daily tasks. We provide recommendations on balance exercises and fall prevention in order to decrease their risk of fall-related fractures. We assess posture in order to choose the appropriate treatment to help prevent the occurrence of a thoracic hyperkyphosis (Dowager’s Hump). We give exercises to strengthen the spinal extensor muscles and stretch the pectoral muscles. As an overall recommendation, we encourage women in this group to lead active lifestyles, including muscle-strengthening and weight-bearing exercises to maintain bone density.

Rehabilitation

Physiotherapy is important for patients who have sustained an acute, painful compression fracture, assisting them in:

- regaining their physical function and confidence in mobility
- managing pain
- learning positioning and transfer techniques that minimize compressive forces on the fracture site
- getting advice about ambulatory aids, hip protectors and spinal corsets
- acquiring new fall-prevention strategies
- creating links with appropriate community resources as well as with other members of the healthcare team
- becoming educated about balance, posture and deep breathing exercises

Physical therapists are also involved in the postsurgical management of osteoporosis sequelae such as hip fractures. In these cases, the rehabilitation process is directed towards optimizing function and independence. After hip surgery, patients can access physical therapy services either through a rehabilitation hospital or centre or through homecare community agencies.

The specific role of the physiotherapist depends on the type of facility — private clinic, community agency, hospital or nursing home — and the type of client that the therapist is working with. Many osteoporosis clinics have a physiotherapist on the team who works within the framework of the clinic. Physicians can also refer their patients to physical therapy clinics in the community.

In addition to clinical treatment and education, physical therapists are often involved in osteoporosis research. Areas of interest include effects of a hyperkyphosis on postural measurements and movement, fall prevention, effects of exercise on bone density, and quality of life issues.

An important role for physical therapists is to identify clients who would benefit from an osteoporosis work-up (e.g., patients who have sustained a Colle’s fracture, patients with a history of falls, etc.) and refer them to their physicians for an assessment. This can help to bridge an existing care gap between fracture and diagnosis, and reduce the number of people at risk of osteoporosis who may be left undetected and untreated.

Teamwork among health professionals is key to ensuring successful management and better outcomes for patients.
Is there any recent evidence to support the theory that statins lower the risk of vertebral fracture, besides lowering cholesterol?

— a GP in Churchill Falls, NF

Dr. Stephanie Kaiser answers: Statins (HMG-CoA reductase inhibitors), widely used for the treatment of hyperlipidemia, inhibit the rate-limiting enzyme involved in cholesterol synthesis. The potent nitrogen-containing bisphosphonates, such as alendronate and risedronate, have a similar mechanism of action. They also block an enzyme in the cholesterol synthesis pathway (farnesyl diphosphate synthase), preventing the production of isoprenoids essential for normal osteoclast function and thereby leading to osteoclast apoptosis.

In rodent studies, Mundy et al observed that statins dramatically increased bone formation rates. They also reported that these drugs enhanced the expression of bone morphogenetic protein-2 (BMP-2) mRNA — important in mediating osteoblastic differentiation and thus bone formation — in cultured mouse or human cells. These anabolic effects on bone were also associated with a decrease in osteoclast number and bone resorption. Statins appear to have an influence on both bone formation and resorption, and were found in vitro to be more potent inhibitors of osteoclastic bone resorption than bisphosphonates.

These findings led to the reexamination of data from various observational and cohort trials to assess the impact of statin use on fracture risk. Several studies (Study of Osteoporotic Fractures [SOF], Fracture Intervention Trial [FIT], Heart and Estrogen/Progestin Replacement Study [HERS]) showed a trend toward fracture risk reduction with statin use (up to 40-50% reduction in all clinical fractures) as well as a modest increase in BMD, not manifested with other lipid-lowering agents. Most recently, the Women’s Health Initiative (WHI), a very large prospective cohort study, was also investigated for a link between statin use and fracture, but no significant effect on either fracture risk or bone mineral density was detected.

Researchers have also looked at case-control studies. While some did report decreases in fracture rates of up to 40-60% with current statin use or with any use in the preceding six months, many of these studies did not adjust for confounding factors such as age, weight or other medical conditions. The largest one (from the United Kingdom General Practice Research Database), involving over 160,000 subjects from 50 to 90 years of age, found no significant effect of statin therapy on fracture.

One theory holds that hyperlipidemia itself may actually be associated with a higher BMD and thus with fewer fractures, although evidence does not support it. An analysis of the SOF data revealed no significant correlation between total cholesterol (TC) or low-density lipoprotein cholesterol (LDL-C) and bone mass. Additionally, there was no relation between TC, LDL-C, or high-density lipoprotein cholesterol (HDL-C) and fracture risk.

Although there are still no placebo-controlled statin studies specifically designed to examine fracture outcomes, some that have had post-hoc analysis of fractures, including the Long-term Intervention with Pravastatin in Ischaemic Disease (LIPID) trial and the Scandinavian Simvastatin Survival Study (4S), have demonstrated no significant benefit.

Randomized, placebo-controlled trials of statin therapy with bone mineral density (BMD) or bone biochemical markers as outcome measures are also lacking. Some cross-sectional studies have been performed, with inconsistent outcomes noted.

To summarize, although some data initially appeared promising, to date no randomized placebo-controlled trials have firmly established the effects of statins on fracture, BMD or biochemical markers of bone turnover.

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The Osteoporosis Society of Canada (OSC) is a national, not-for-profit organization dedicated to educating, empowering and supporting individuals and communities in the prevention and treatment of osteoporosis. The OSC, guided by its Scientific Advisory Council (SAC) made up of osteoporosis experts from across the country, works with healthcare professionals to make the latest prevention, diagnostic and treatment options available to Canadians. The OSC has developed the 2002 clinical practice guidelines — accessible from its redesigned and updated website at www.osteoporosis.ca — for use by physicians in their daily practice.

FOR PATIENTS

Direct your patients to these helpful resources; most are available free-of-charge by calling 1-800-463-6842.

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