Optimizing Spine Care for Women, from Adolescence to Later Life

A Message from Gordon R. Bell, MD
Director, Center for Spine Health

Although some spinal conditions are common to both sexes and affect males and females equally, others are either specific to women or are more common in women than in men.

These gender-specific differences may be due to several factors, including hormonal, anatomic or environmental. It is important for both the general practitioner and the spine specialist to be aware of these entities in order to recognize them, to offer optimal treatment when possible and to refer the patient if usual treatment is not palliative. This issue of Spinal Column examines some of the more common conditions that affect women at all points along the age continuum, in the hope that this information will help all physicians optimize care of their female patients.

Dr. Laura Goldberg examines a common cause of back pain in the adolescent female athlete: lumbar spondylolysis. With more young girls participating in athletics than ever before, spondylolysis is actually becoming more common in the young female athlete than in the young male athlete. Dr. Goldberg reviews important features of the history and physical examination and offers some pears regarding the radiographic diagnosis and treatment of this common condition.

Dr. Tagreed Khalaf explores back pain associated with osteoporosis, a common condition in women at the other end of the age spectrum and an important factor in the development of fragility fractures. She reviews the definitions of osteoporosis and osteopenia and discusses their etiology. Dr. Khalaf also discusses the importance of screening for osteoporosis and the use of a novel electronic fracture risk assessment tool (FRAX®) that can help the clinician estimate a patient’s 10-year probability of developing a major osteoporotic fracture. Finally, she reviews the basics of osteoporosis treatment.

Maribeth Gibbon, PT, outlines the role of exercise in the treatment of patients with osteoporosis. Although applicable to both men and women, exercise is especially important to women because symptomatic osteoporosis affects them more than men. She outlines a multifaceted program consisting of aerobic conditioning, strengthening, stretching, and assessing the patient’s static and dynamic balance.

Dr. Deborah Venesy examines the incidence and etiology of back pain in pregnancy. This common, yet poorly understood entity may affect women at both the early and late stages of pregnancy. She offers some strategies for minimizing the impact of back pain throughout a woman’s pregnancy and in the immediate postpartum period.

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Appropriate Treatment for Osteoporosis: a Missed Opportunity

By Tagreed Khalaf, MD

Osteoporosis is similar to hypertension as a disorder with a long asymptomatic interval before clinical manifestation. Unrecognized and untreated in its preclinical phase, osteoporosis may result in significant morbidity and mortality.

Fragility fractures are the single most morbid and clinically significant consequence of osteoporosis, occurring most frequently in the vertebral body. Patients with one or more vertebral compression fractures may ultimately experience chronic low back pain, loss of height and kyphosis leading to symptomatic biomechanical changes in the spine.

Pulmonary compromise manifested by restrictive lung disease may become evident as a result of the increased thoracic kyphosis.

Some patients experience lower levels of functional performance compared with controls, including difficulty with activities of daily living that results in a sedentary lifestyle, which leads to progressive deconditioning and further bone loss. Up to 40 percent of persons with osteoporosis may develop depression due to low self-esteem and body image changes. Patients with a greater likelihood of developing depression have sustained more than one compression fracture, are more socially isolated and are older.

Low Treatment Rate

Unfortunately, the majority of patients who experience a fracture do not receive appropriate treatment for osteoporosis. Approximately 50 percent of female patients who sustain a compression fracture do not receive osteoporosis treatment. The rate of treatment after fracture is even lower for men. This represents a significant missed opportunity to reduce future fracture risk, particularly given that the likelihood of fracture at a different level approaches 10 to 20 percent within one year of the initial fracture.

Beyond the personal suffering and functional impact, the economic burden on society is considerable. The cost of caring for the more than 2 million osteoporotic fractures in 2005 was estimated at $17 billion. These figures are expected to increase 50 percent by 2025, when the annual fracture incidence will surpass 3 million and costs will exceed $25 billion. Due to

Screening Guidelines: Groups at Risk for Osteoporosis

Bone mineral density testing is indicated for the following populations:

- Women age 65 and older, men age 70 and older (regardless of clinical risk factors)
- Younger postmenopausal women and men age 50 through 69 who may raise concerns based on their clinical profile
- Women in menopausal transition with a risk factor for fracture (low body weight, high-risk medication or prior low-trauma fracture)
- Adults who sustain a fracture after age 50
- Adults taking glucocorticoids in a daily dose > 5 mg or equivalent for > 3 months
- Any person being considered for pharmacologic therapy for osteoporosis
- Anyone being treated for osteoporosis, to monitor treatment effect (generally, every 2 years)
- Anyone not receiving therapy in whom evidence of bone loss would lead to treatment

population growth, a significant proportion of this anticipated increase will result from the incidence of osteoporosis in Hispanics.

**Screening Tools**

Because osteoporosis is a silent disease until it manifests clinically as fracture, screening for asymptomatic disease in high-risk persons represents an initial step before treatment. Bone mineral density (BMD) measurement by dual-energy X-ray absorptiometry (DEXA) is the screening tool of choice.

The World Health Organization has defined osteoporosis and osteopenia on the basis of bone mineral density. Osteoporosis is present when the T score is at least -2.5. Severe osteoporosis is defined as a T score of at least -2.5 in the presence of one or more fragility fractures. (T score is the number of standard deviations above or below the average BMD for healthy young white females.)

While bone mineral density is an excellent predictor of fracture risk, density combined with clinical risk factors for fracture is a better predictor than either one alone. The fracture risk assessment tool (FRAX®) is an electronic clinical tool developed to calculate fracture risk on the basis of bone mineral density of the femoral neck; the patient’s age, sex, height and weight; and clinical risk factors:

- personal history of previous fracture
- history of parental hip fracture
- current smoking
- history of long-term glucocorticoid use
- rheumatoid arthritis
- daily alcohol consumption of three or more units

The FRAX tool also includes the presence or absence of other, secondary causes of osteoporosis. The tool estimates the 10-year probability of a major osteoporotic fracture. FRAX is available to clinicians online (www.shef.ac.uk/FRAX).

**Pharmacologic Therapy**

Current guidelines recommend that pharmacologic treatment be offered to those with known osteoporosis, those who have experienced fragility fractures and those at increased risk for developing osteoporosis, based on an analysis of risk factors. The National Osteoporosis Foundation specifically defines this population as having a 10-year probability of a hip fracture greater than 3 percent or a 10-year risk of a major osteoporotic fracture greater than 20 percent, based on the FRAX calculator.

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**Surgical Treatment for Vertebral Compression Fractures**

For some patients, surgical intervention is an option for treatment of osteoporotic vertebral compression fractures. Strength can be restored to a compressed vertebral body by a cement augmentation technique in which polymethylmethacrylate (PMMA) is injected into the fractured vertebra. This relatively simple procedure is done through one or two small stab incisions, through which a trocar is introduced. The relief of pain is usually immediate and dramatic. In some cases, the height of the compressed vertebra can also be improved.

Not all patients who sustain a vertebral compression fracture are optimal candidates for cement augmentation, but it is an available option that should be considered for most patients with an osteoporotic compression fracture.

— Gordon R. Bell, MD

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![White mass denotes post-operative cement augmentation of L2 vertebral compression fracture.](image)
Multiple pharmacological agents available for the treatment of osteoporosis have been shown to decrease vertebral fracture risk up to 50 percent. These agents can be classified as antiresorptive or anabolic. Currently available antiresorptives include bisphosphonates, selective estrogen-receptor modulators and calcitonin. Teriparatide (recombinant human parathyroid hormone 1-34) is the only anabolic drug available for the treatment of osteoporosis.

Despite clearly meeting criteria for a condition that merits aggressive screening and treatment, osteoporosis continues to be underdiagnosed and undertreated. The responsibility to ensure that the underlying bone disorder is adequately addressed rests at multiple levels: with the internist or family physician to ensure appropriate screening and treatment, as well as with the spine physician treating the vertebral fracture. With state-of-the-art screening and multiple pharmacologic treatments, missed opportunities are no longer acceptable.

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Osteoporosis and Osteopenia: World Health Organization Criteria

<table>
<thead>
<tr>
<th>Classification</th>
<th>Criteria</th>
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<tbody>
<tr>
<td>Normal range</td>
<td>BMD up to ± 1 SD of the main of the young adult reference range</td>
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<tr>
<td>Osteopenia adult reference range</td>
<td>BMD between 1 and 2.5 SD below the main of the young adult reference range</td>
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<tr>
<td>Osteoporosis adult reference range</td>
<td>BMD greater than 2.5 SD below the mean of the young adult reference range</td>
</tr>
<tr>
<td>Severe osteoporosis</td>
<td>BMD greater than 2.5 SD below the mean of the young adult reference range in the presence of one or more insufficiency fractures</td>
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Bone mineral density (BMD)
Standard deviation (SD)
Musculoskeletal Pelvic Floor Pain in Women

By Juliet Hou, MD

Improved clinician recognition of pelvic floor dysfunction will reduce impairment and disability for women with pelvic pain. Musculoskeletal causes of this condition require an expert grasp of anatomy, function, and the relationship between the spine and pelvis. Understanding the functional decline associated with muscle and nerve dysfunction in the pelvis allows us to direct the nonoperative care of women with pelvic floor pain.

Defining the Problem

Up to 20 percent of women age 18-50 suffer from chronic pelvic pain. Disorders causing pain in the pelvic floor may be visceral and/or somatic. Gynecological, psychological, gastrointestinal, urological, musculoskeletal and neurological sources are the major contributors.

Common pelvic pain conditions in women include endometriosis, vulvodynia, vestibulitis, pelvic floor tension myalgia, pudendal neuralgia, levator ani syndrome, interstitial cystitis, irritable bowel syndrome, vaginismus and dyspareunia. A woman's unique pelvic anatomy and biomechanics place her at increased risk of developing pelvic region pain compared with a man.

The pelvic musculature reinforces urethral closure during increases of intra-abdominal pressure, causes inhibitory effects on bladder activities, assists in pelvic and spinal stability, contributes to sexual arousal and performance, and assists bowel/bladder continence. The lumbar spine and hip muscles and fascia provide mobility and stability for the pelvis. The collective levator ani and coccygeus muscles with surrounding fascia constitute the pelvic diaphragm.

Although it is not widely discussed, the pelvic floor has an important role in the function of core muscle stabilization. The core muscles refer to the muscles of the trunk (abdominals, quadrate lumborum, spinal muscles and hip muscles), the diaphragm and the pelvic floor. Essentially, the pelvic floor is the “floor of the core.” Pelvic floor training may be a key feature in reducing pain and dysfunction in spine conditions.

Hypotonic or hypertonic (decreased or increased resting state) muscles and tissues of the pelvic floor may lead to pelvic pain. For example, the obturator internus is a primary hip rotator. An intra-articular hip disorder, such as osteoarthritis or acetabular labrum tear, may cause significant pain and movement adaptation, promoting an increased resting state of the obturator internus. In such a case, the woman may present with pain at the posterior pelvis, lateral hip or groin, and pain during/after sexual activity.

Similarly, lumbar radiculopathy may increase the pelvic floor musculature resting state. The lower lumbar roots and sacral roots innervate the pelvic floor. As a result, patients with lumbar radiculopathy may present with pelvic floor pain.

Persistent muscle contraction of the pelvic floor related to noxious visceral stimulation, such as endometriosis or irritable bowel syndrome, can also increase the resting state of pelvic floor muscles. This can result in increased pressure within the spinal column that can contribute to low back pain.

Assessment

Just as the etiology for pelvic pain in women is variable, so is the presentation. Women may freely describe symptoms of low back, gluteal, groin or leg pain, but they may not easily offer their symptoms of vaginal, rectal or lower abdominal pain. Because of the psychosocial issues involved in this particular pain problem, it is important for the clinician to ask the woman whether she is experiencing any internal
Direct branches from S3 and S4 innervate the levator ani. The musculature of the perineum is innervated by the pudendal nerve from S2, S3 and S4 of the sacral plexus.
Women with pelvic pain benefit from a multidisciplinary approach to address psychological, neurochemical and mechanical factors.

**Treatment**

Once infection and serious medical causes for pain have been excluded, women with pelvic pain benefit from a multidisciplinary approach to address psychological, neurochemical and mechanical factors.

**Medication**

Pharmacotherapy can modify pain and anxiety and facilitate a restorative sleep pattern. Myofascial and neuropathic pain may respond to tricyclic antidepressants or similar agents such as duloxetine. Gabapentin and pregabalin are useful for pelvic floor pain with a neurogenic component. Topical agents such as estrogen cream may help patients with vaginal atrophy related to menopause, while lidocaine cream can desensitize the vulvar area.

**Physical therapy**

Therapeutic exercise directed by a physical therapist with training in pelvic pain is essential. Because multiple pain-sensitive structures are involved in pelvic pain, treatment focuses on increased or decreased muscle activity and associated weakness. The immediate goal of therapeutic exercise is to restore muscle length and strength balances. The final goal is to restore function and facilitate pain reduction. Biofeedback and electrical stimulation through use of surface electrode or vaginal or rectal probes can be incorporated to treat patients with hypotonic or hypertonic pelvic floor muscles. Proper breathing techniques with exercises and activities can help pelvic floor relaxation.

**Adjunct injection**

Muscles with trigger points – particularly the obturator internus and levator ani – that respond transiently to soft-tissue techniques may benefit from short-acting anesthetic agents (1 percent or 2 percent lidocaine) or dry needling. Combining trigger point injections with physical therapy and/or manual techniques may further benefit the patient.

Women with lumbar radicular pain and concomitant pelvic floor pain may benefit from an epidural or nerve root injection. Caudal epidural injection has been shown to reach at least the L4-L5 level 85 percent of the time.

A fluoroscopically guided sacroiliac joint injection can be diagnostic and therapeutic for women with posterior pelvic and pelvic floor pain. If the pelvic floor pain can be reproduced with provocative hip maneuvers on physical examination, an image-guided hip injection may be therapeutic and diagnostic. Pain particularly related to the obturator internus may be reduced after injection.

Pain localized to the coccyx may be alleviated after an injection of the surrounding muscle and fascial attachments. A pubic symphysis injection can reduce pain related to symphysitis or osteitis pubis.
Customization of Exercise Programs for Osteoporotic Patients

By Maribeth Gibbon, PT

Many patients with osteoporosis are familiar with the term “weight-bearing exercise,” but not all know how to apply this and other relevant concepts to their own fitness programs. It is important for patients to understand the principles of exercise in osteoporosis.

The goals of exercise in persons with osteoporosis are to:
• maintain or increase bone mineral density (BMD)
• improve musculoskeletal strength
• optimize posture
• prevent falls
• and, ultimately, to prevent fractures

A well-rounded exercise program for all of us, including those with osteoporosis, will include three components: cardiovascular/aerobic conditioning, strengthening/weight training and stretching. There are special considerations for those with osteoporosis:
• Avoidance of spinal flexion and rotation during exercise and other activities of daily living, as these are the positions in which most vertebral fractures occur. This caution is especially important for patients with a previous low-trauma fracture.
• Strengthening of spinal extensor musculature.
  Multiple studies have shown a decrease in vertebral fracture rates and improvement in posture among those who perform this type of exercise.

Let’s look more closely at the three exercise components.

Cardiovascular/Aerobic

This component is best addressed with weight-bearing exercises. Therefore, walking or jogging is preferable to swimming or biking. (The exception would be the deconditioned, inactive person who may tolerate only low-impact activities.) In order to improve bone density, increased loads must be placed upon the bone, which means the intensity must be higher than usual. While walking, for example, one can walk faster, vary the speed, include inclines, or walk backward or sideways. To see training benefits, cardiovascular exercise should be done three to five times a week for a duration of 30 to 45 minutes, including warm-up and cool-down periods.

These parameters may be modified for the person who has been inactive recently due to pain, comorbidities or lifestyle. In other words, some activity is better than none.

Strength

Training must be site-specific in order to increase bone density. Thus, hips, wrists and spine should be targeted with free weights and/or weight machines. Research has shown that an increased load and fewer repetitions (up to three sets of 8 to 12) are most effective.

Trunk extensor strengthening has proved crucial in preventing vertebral fractures and improving posture.

Patients’ current strength training programs should be reviewed and modified to eliminate flexion maneuvers, emphasize extension exercises and target common areas of fracture. Strength training should be done at least twice a week to see gains.

Stretching

Limitations in flexibility in persons with osteoporosis are commonly noted in spinal extensors, shoulder elevators and external rotators, hip flexors and internal rotators, and ankle dorsiflexors. Stretching exercises are useful for reducing pain and facilitating optimal posture in these patients. Stretches should be performed slowly and smoothly to a point of stretch, not pain. For maximum benefit, they should be done once or twice a day.
Patients often ask if they can begin or continue low-impact exercise classes such as Pilates and yoga, which include many flexion maneuvers. When they understand the concept of spinal flexion vs. extension, they can make individual modifications and safely participate in group classes.

Patients with a history of vertebral fracture should also be educated on the increased risk inherent in sports such as bowling, tennis and golf, which demand frequent flexion and rotation motions. Technique can be modified for safer play should patients decide to continue with these sports.

Maximizing Health and Safety

Static and dynamic balance in patients with osteoporosis should be evaluated as part of a fall prevention program. While persons with osteoporosis are not at elevated risk of falling, the consequences of a fall may be more severe for them than for the general population. Those with balance deficits should incorporate appropriate exercises into their routines. One representative example is tai chi classes, which can be beneficial for those at increased fall risk. Patients can integrate additional balance exercises into their home exercise programs.

Referral to an outpatient physical therapy program is a salutary first step for individuals newly diagnosed with osteopenia or osteoporosis (with or without pain) and those looking to formulate or update a personalized exercise program. Ultimately, the goal is for these patients to participate independently in safe exercise programs to maintain a healthy lifestyle, including good bone health.

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Among the fragility fractures of osteoporosis, inter-trochanteric hip fracture poses the greatest risk in terms of both patient survival and life-altering consequences. The mortality rate with multiple vertebral fractures approaches the rate for hip fracture. (Scan and caption information provided by Bradford Richmond, MD, FACR, Staff Radiologist at Cleveland Clinic.)
Spondylolysis in the Young Athlete

By Laura D. Goldberg, MD

Low back pain is a complaint of more than 35 percent of adolescent athletes compared with 15 percent of athletes of all ages. One of the most common causes in the young athlete is spondylolysis, a stress fracture of the pars interarticularis. In the general population, the prevalence is 4 to 6 percent and twice as common in males as females. In contrast, female athletes are more likely than males to develop stress fractures of the pars.

Although athletes of all ages may be symptomatic from spondylolysis, young athletes are at increased risk due to immature areas of growth cartilage and ossification centers that are injured from torsion, compression or distraction forces. The mechanism is controversial, but thought to be mechanical failure due to fatigue. Other contributing etiologies may be trauma, developmental defects or genetics. Adolescents in extension-type pursuits such as ballet, gymnastics, football, soccer and diving are at higher risk, but overtraining or a sudden increase in training places athletes in all sports at risk.

As the athletic population expands, spondylolysis is increasingly being diagnosed in patients between 5 and 10 years old. Overuse injuries may be difficult to overcome and can recur in 26 percent of males and 33 percent of females. Early recognition and treatment are crucial to minimize morbidity and allow safe and early return to sports.

Symptoms

The symptoms of spondylolysis are often insidious in onset, but may be acute when trauma completes an evolving fracture or worsens symptoms of a subclinical fracture. Athletes often present with aching lower back pain that may radiate into the buttocks or upper thigh and worsens with activity and extension maneuvers. It is important to ask about night pain and constitutional symptoms, which suggest an alternative diagnosis.

Physical examination, including neurologic exam, may be subtle but often shows limited motion with loss of lordosis, lumbar muscle spasms, and pain with back extension and single leg extension (stork test). Tenderness to palpation may be unilateral but is often bilateral. The most commonly involved vertebral level is L5. Nerve root irritation may be present, but the athlete typically has full strength without neurologic deficits.

Radiographic Options

Diagnosis depends on clinical suspicion, but radiographic studies are important in confirming the diagnosis. Currently, there is no consensus on the use of radiographic studies.

Plain radiographs, including anterior-posterior and lateral views, have low sensitivity for diagnosing spondylolysis, and early changes may not be detected. Lateral deviation of the spinous process due to rotation toward the shorter of the laminae suggests spondylolysis. Oblique films may show the “Scotty dog” sign with fracture of the neck; however, given the low sensitivity, oblique films are not recommended.

SPECT scans are more sensitive and have been the gold standard for diagnosis. They identify bone turnover and remain positive for six to nine months, allowing identification even after the patient has become asymptomatic. CT scans have received attention for their high sensitivity and their ability to show bony definition allowing characterization of fractures and following of fracture to bony union. CTs are the gold standard for detailing bony morphology and defining bone pathoanatomy. MRIs are being used more frequently, as there is no radiation exposure and they show metabolic activity of bone. Unlike CT scans, however, they are not useful for following fractures to union.

Determination of which radiographic study to use depends on treatment goals. Treatment varies depending on age of the athlete, career stage, level of competition and upcoming competition schedule.

Another important variable is the acuteness of the fracture, which can be determined with SPECT and CT or MRI. Acute lesions may present insidiously or suddenly after a trauma. The important factor is the presence or absence of metabolic activity and the potential to achieve bony union. Acute lesions may not be present on plain films but they light up on
SPECT and MRI, without evidence of sclerotic margins on CT or MRI.

Chronic lesions often present insidiously, but may become symptomatic after trauma when the lesion has been present subclinically or has not been treated. These lesions may be present on plain films, CT with sclerotic margins or MRI. They have poor chance of achieving bony union.

Treatment

While treatment varies greatly among practitioners, the primary objective is to alleviate symptoms and allow for a safe return to competition. Most patients can be managed conservatively, with more than 90 percent achieving good long-term results.

Treatment depends on healing potential. For the acute lesion with a good chance of healing, most experts recommend a period of rest to reduce symptoms and allow osseous healing. Immobilization of the joint is difficult to achieve; therefore, rest is prescribed to minimize the inciting forces that led to the fracture.

During the rest time, activity is limited to physical therapy and low-impact sports such as cycling and swimming. All extension-type activity should be avoided. When pain free, the athlete may start physical therapy for back and core strengthening. Often, three months or more of rest are required for healing. However, if pain free with physical therapy and low-impact activities, the athlete may progress more quickly. Progressive return to sport is allowed once a normal clinical exam with full, pain-free range of motion and full strength is achieved.

If full bone healing is not likely, a more rapid approach is followed, with a period of rest to alleviate symptoms, physical therapy for back and core strengthening, and progressive return to sport. Whether the fracture is acute or chronic, if the patient is symptomatic at rest, a low-profile extension blocker brace often helps alleviate symptoms more quickly. The brace may be worn full time until symptoms subside and then weaned to use just for activities and sport until full, pain-free return to sport is achieved.

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Suggested Reading


Incidence

Three out of four women experience some degree of back pain during pregnancy. In some women, symptoms begin before they show physical signs of the pregnancy and last until delivery. An estimated 20 percent of pregnant women experience low back pain by week 12, when mechanical changes do not yet factor as a significant cause. Up to 50 percent experience back pain during weeks 24-36.

Approximately one-third of patients note that their back pain increases as the day progresses, whereas another one-third report that the pain worsens at night and affects their sleep. Anecdotal evidence suggests that women who have severe low back pain during pregnancy are at increased risk for back pain following pregnancy. Occupation does not seem to affect incidence.

Etiology

The etiology of back pain during pregnancy is not well understood, but is believed to be related to many factors: change in body posture, hormones that cause relaxation of connective tissue, poor body mechanics and muscle fatigue. There are contradictory study results correlating increased levels of relaxin with complaints of back pain in pregnant women. The incidence of acute radiculopathy/herniated disc during pregnancy is very rare: estimated at 1 in 10,000 women.

Examination Findings

Posterior pelvic pain may be distinguished from lumbar spine pain by a few maneuvers. Both the Patrick Fabere maneuver and a one-legged stance put pressure on the pelvic joints and, if positive, are suggestive of pelvic pain. Tenderness about the soft tissues around the sacroiliac, pubic symphysis and gluteal areas also assists in distinguishing pelvic pain from tenderness above the waist and lumbar paraspinal region. The pelvic pain provocation tests are more reliable than palpation.

Treatment

Only about 50 percent of pregnant women visit a physician for low back and/or pelvic pain. Among those who see a physician, about 70 percent are treated. When treatment is sought, conservative management is the preferred method. Treatment options include physical therapy, TENS, medication, acupuncture, chiropractic or osteopathic manipulation, yoga and stabilization belts. A more detailed overview of common pain management approaches follows.

Exercise

Regular aerobic and general conditioning exercises before and during pregnancy will strengthen the abdominal, back and pelvic muscles, which improves posture, body mechanics and functional strength. In one study\(^1\), subjects who exercised three times a week for 12 weeks during the second half of pregnancy showed significant reduction in the intensity of back pain.

General exercises such as walking, swimming and bicycling increase muscle tone and strength, improve endurance and decrease fatigue. A Swedish study\(^2\) showed that a water aerobic exercise program was more effective than a land-based program at reducing pregnancy-related back pain and sick leave due to pregnancy.
**Osteopathic manipulative treatment (OMT)**
Relatively little research has been conducted on OMT during pregnancy. A randomized, placebo-controlled trial of 144 subjects indicated that “OMT lessens or halts the deterioration in back-specific functioning that often characterizes the third trimester of pregnancy and thereby provides an important clinical benefit when used as complementary therapy. Although there is evidence that OMT may provide an important clinical benefit in reducing back pain, the results are not as conclusive as they are for back-specific functioning.” The authors suggest that a larger trial is warranted to better assess the effects of OMT.

**Pelvic support and sacroiliac (SI) support belts**
These devices provide stability to the SI joint/pelvic region, offering another way of decreasing pregnancy-related low back/pelvic pain.

**Self-care**
Frequent position changes, including stretching throughout the day, sleeping on one’s side with a pillow between the legs, and using proper posture and body mechanics are also important in maintaining a healthy back. Care should be taken to use the larger muscles of the legs and arms while moving objects to prevent muscle strain.

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Optimizing Spine Care for Women, from Adolescence to Later Life
(continued from cover)

Finally, Dr. Juliet Hou describes the poorly understood entity of pelvic floor dysfunction associated with chronic pelvic pain in women. She discusses the myriad etiologies associated with this condition and the diagnostic difficulty it poses for the clinician. Dr. Hou presents recommendations for evaluating this condition and offers treatment options, including pelvic floor training for reducing some of the musculoskeletal effects of pelvic floor dysfunction.

We thank you for taking time to read this issue of Spinal Column and hope that you will find the articles presented here informative and useful in your management of women with back disorders.

FOR MORE INFORMATION
To learn more about the Center for Spine Health, please contact Dr. Bell at 216.444.8126 or our administrator, Susan Rossi, at 216.444.6890. To refer patients, call 216.636.5860 or toll-free 866.388.2264.