Physiatry offers wholistic approach for perinatal musculoskeletal complaints

By Gwendolyn Sowa, MD, PhD
Assistant Professor of Physical Medicine and Rehabilitation

Musculoskeletal complaints are increasingly common in pregnancy, particularly as more women delay conception into their 30s and 40s. Unfortunately, these issues are frequently ignored or — worse — misdiagnosed, leading to unnecessary tests and procedures. However, when addressed early, musculoskeletal issues can be safely and simply managed during pregnancy, preventing later dysfunction and chronic pain syndromes.

Most pregnancy-associated and postpartum musculoskeletal pain relates to positioning and posture. With the changes in the woman's center of gravity and rapidly increasing weight during pregnancy, low back pain (LBP) becomes a frequent complaint. While the increased intra-abdominal pressure and altered forces can lead to disk disruption and increased incidence of lumbosacral radiculopathy, new-onset LBP in pregnancy is frequently myofascial in origin. In addition, disruption of the core — through relaxation of the pelvis and the effects on the pelvic floor — predisposes women to LBP and pelvic pain. Rectus diastasis, which is not uncommon in pregnancy, further contributes to this disruption of the muscular core, and cesarean delivery can result in significant core dysfunction. Muscle energy techniques and simple core exercises, which can be safely initiated during an uncomplicated pregnancy, may help to decrease postpartum pain and improve recovery after delivery.

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Carpal tunnel syndrome (CTS) is another ailment frequently occurring during pregnancy, owing in part to the edema seen especially in the third trimester. Patients with CTS will benefit from early referral to physical therapy for stretching, strengthening, fitting for an orthosis if necessary, and education regarding activities that exacerbate symptoms. Conservative management is recommended, as symptoms frequently improve after delivery and ensuing diuresis and weight loss. In refractory or severe cases, steroid injections may be performed safely in otherwise uncomplicated pregnancies.

Pelvic pain is common during pregnancy and postpartum. After gynecological dysfunction is ruled out, consideration should be given to commonly overlooked myofascial pelvic pain. Persistent sacroiliac dysfunction and separation of the symphysis pubis after delivery can contribute to the myofascial pain normally experienced after the trauma of vaginal delivery. When left untreated, such symptoms can lead to persistent impairment and disability. Similarly, misdiagnosis frequently results in unnecessary surgery and chronic pain syndromes. Such muscular imbalances can frequently be corrected through properly directed muscle energy techniques and strengthening, and physiatrists working along with women’s health therapists to correct such imbalances through medications, injections, and pelvic floor therapy (external and internal) when indicated. Such an approach frequently results in excellent outcomes for patients frustrated by multiple treatment failures.

Overuse injuries are common during the postpartum period. Continued hormonal changes and poor biomechanics while lifting and caring for the baby only exacerbate the problem. Lifting even an 8-pound infant can impose a significant strain on the spine when coupled with poor biomechanics and a weakened core. Instruction in proper body mechanics can help alleviate LBP and prevent additional injury. Simple advice (suggesting that the crib railing be lowered before placing the baby to sleep) or simple instructions (such as how to stabilize the core when lifting or bathing the infant) can prevent additional strain.

Postpartum neck pain is another common complaint, particularly in nursing mothers as they strain to ensure that the baby is properly positioned. New mothers should be taught to bring the baby to the breast, not the breast to the baby, to prevent strain on the neck and periscapular musculature. Once the baby has fallen asleep in their arms, new mothers are often hesitant to reposition, even if doing so would relieve pain. Women should be instructed in simple posture and “opening” stretches, such as scapular retraction. Use of positioning aids, such as pillows and lumbar supports, should be encouraged to ensure proper posture. Such simple interventions can have profound impact on pain and quality of life in women adjusting to a life-changing and already challenging event.

Physiatrists are uniquely posed to diagnose and treat perinatal musculoskeletal issues. They can address biomechanics, treat pain, and perform interventional procedures when indicated. Early referral can prevent unnecessary dysfunction and development into a chronic pain state. The wholistic approach commonly employed by physiatrists – not only in treating the pain but also in addressing the resultant dysfunction, social enablers, contributions of mood disturbances, and situational factors – can result in excellent outcomes. Moreover, because of the multidisciplinary nature of physical medicine, the physiatrist is well positioned to coordinate the care of this frequently complicated patient population. Physiatrists trained in pain management and musculoskeletal medicine, working with physical therapists who focus on women’s health, can fill an important gap in the treatment of women with musculoskeletal impairments during pregnancy and in the postpartum period.

Dr. Sowa specializes in treatments for neck pain and back pain and general rehabilitation for patients with musculoskeletal injuries, including pelvic pain and sacroiliac joint dysfunction. Her research interests include investigation of the effects of mechanical forces on intervertebral disk disease.
Lymphedema demands long-term management

By B. Candice Pack, DO
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Lymphedema is a chronic and potentially debilitating condition. The subcutaneous build-up of high-protein lymph results from failure of the lymphatic system to manage the given lymph load. Lymph is produced when tissue fluid, cells, fat, and other substances are collected by initial lymph vessels — the lymph capillaries — from interstitial spaces. Chronic mechanical insufficiency of the lymphatic system leads to high-protein edema with fibroblast deposition and fibrosis, as well as other tissue changes that result in hypoxia. These changes give the characteristic effect of tissue hardening, impaired tissue healing, and increased risk for recurrent infections.

Lymphedema is estimated to affect more than 3 million Americans, but the true incidence is unknown, as the condition is probably grossly under-recognized and generally underdiagnosed. The most common cause of lymphedema worldwide is lymphatic filariasis, which affects more than 120 million people, according to the World Health Organization.

In the United States, lymphedema is most commonly associated with breast cancer. Although upper-extremity lymphedema is widely recognized as a potential complication of some breast-cancer treatments, lymphedema can also involve the lower extremities, head and neck, viscera, trunk, or genital region. Secondary lymphedema may be a complication of radiation therapy or surgical excision of lymphatic vessels or nodes. It may also occur as a result of obstruction due to mass, infiltration due to malignancy, chronic infection, filariasis, chronic venous insufficiency, or obesity.

Primary lymphedema is generally either hereditary in nature or resulting from genetic alteration. It is most often classified as follows: congenital lymphedema — being present at birth; lymphedema praecox — occurring after birth, but prior to age 35; and lymphedema tarda — occurring after the age of 35. Lymphedema praecox, the most common primary form, occurs more often in females, often around the time of puberty or pregnancy. Primary lymphedema can be unilateral or bilateral; if bilateral, the typical distribution is asymmetrical.

Lymphedema is primarily a diagnosis of exclusion. Diagnosis is based on a comprehensive history and physical examination; lymphoscintigraphy can be a useful adjunct, providing information regarding lymphatic vessel anatomy and functional capability. Once a diagnosis is made, recommended treatment typically includes complete decongestive therapy, a two-phase approach.

Initially, therapy involves an intensive phase in which the patient undergoes a series of visits with a health professional who is specifically trained and preferably certified. This usually occurs on an outpatient basis. The intensive phase involves manual lymph drainage, specialized bandaging, range-of-motion exercise, meticulous care of skin and nails, education, and training. The manual lymph drainage is a specific technique used with lighter touch than standard massage. Its purpose is to promote drainage of lymph using lymphatic collaterals, stimulate contractile forces, and break up fibrosis.

The most common cause of upper-extremity lymphedema in the United States is poor lymph drainage following node excision (or high-dose radiation) for breast cancer. The axillary lymph nodes that drain the breast also drain the arm and hand.

This is immediately followed by bandaging with short stretch bandages to maintain volume reduction and provide resistance against muscular contractile forces to further assist in drainage.

The intensive phase is followed by a maintenance phase, which is managed by the patient or caregiver. Patients are typically measured for garments to wear daily to maintain volume reductions on a long-term basis. Mobility, as appropriate, and adherence to a program of meticulous care of skin and nails are crucial to maintaining the gains realized in the intensive treatment phase.

Currently, there are no FDA-approved medications to treat lymphedema. It is a manageable condition, but without adequate treatment, lymphedema usually progresses and becomes more resistant to treatment, resulting in declining therapeutic responses. Untreated or inadequately managed lymphedema eventually interferes with mobility, self-care, and activities of daily living.

Longstanding untreated lymphedema may progress to lymphangiosarcoma, also known as Stewart-Treves syndrome, an aggressive malignancy with a poor prognosis once diagnosed. It is thus imperative that health care providers recognize the signs and symptoms of lymphedema and provide early referral for specialized lymphedema treatment.

Although physicians from a variety of specialties have additional training in lymphology, many are physiatrists with special interest in women’s rehabilitation, cancer rehabilitation, or wound care. It is important for patients to be under the care of a physician with expertise in lymphedema and experience in coordinating the care of patients with this complex condition.

Dr. Pack’s practice focuses on rehabilitation issues in women’s health, including post-radiation or post-surgical rehabilitation for breast cancer patients, lymphedema management, back and pelvic pain, therapeutic exercise during and after pregnancy, and postarthroplasty rehabilitation.
Study investigates effects of gender in traumatic brain injury

Perhaps because the incidence of traumatic brain injury (TBI) is higher in men than it is in women, the large majority of clinical and animal research on TBI has been with males. Women account for about 25 percent of the TBI population, and recent research suggests that female hormones may afford acute neuroprotection. However, clinical studies evaluating gender differences in TBI pathophysiology and outcome have found that functional outcome is worse for female TBI patients.

Determining the role of endogenous hormones in acute neuroprotection and later functional recovery is a major focus of the study, “Evaluating the impact of neuroendocrine hormones on pathophysiology and outcomes after TBI.” This ongoing study is part of the work of principal investigator Amy K. Wagner, MD, of the role of hormones and markers of pathophysiology in the brain-injury recovery process.

Understanding the role of sex hormones both during the acute phase and in later outcome is important to optimize TBI interventions for both genders.

Researchers in the current study are analyzing post-TBI serum and cerebrospinal fluid (CSF) for levels of several hormones and biomarkers of neurotrauma. During the first week following injury, blood samples and CSF are collected for analysis. Follow-up includes neuropsychological assessment at six and 12 months post-TBI.

Early assessments suggest that, among people who initially survive their injuries, global outcome and disability levels appear to be better for females. Preliminary analyses also demonstrate disruptions in CSF levels of several biomarkers of injury, some of which appear to be influenced by gender, over the first six days post-injury. Biomarker analysis currently includes levels of cell injury, antioxidant reserves, and protein oxidation.

CSF analysis over the first five days following injury reveals a disruption in hormone levels. CSF cortisol levels are markedly elevated in the setting of low levels of progesterone, testosterone, and estrogen. In addition, gender appears to influence the time course for production of some hormones in the CSF.

Initial analysis also reveals disruption in the pattern of serum hormone levels over the first five days post-TBI. The association of serum hormones with pituitary function suggests that hypogonadotropic hypogonadism may occur in males early after injury. Ongoing work will determine the duration and severity of this phenomenon, as well as the relationship of pituitary function and female peripheral reproductive hormone status. Preliminary analysis suggests an association between serum and CSF progesterone levels. These data also suggest that CNS progesterone, a substrate for neurosteroidogenesis, depends in part on progesterone levels in the periphery. This association may also have implications for systemic progesterone supplementation as a treatment for TBI.

One of the key unknown aspects of this study is how hormone/biomarker levels change over time following TBI, and also whether patterns of change differ across particular groups of TBI patients. Trajectory analysis can be used to track changes in groups of individuals and to model trends over time. Initial analysis suggests that subjects can be clustered based on temporal patterns of CSF hormone and biomarker concentration. In some cases, biomarker clustering patterns have been linked with mortality. These findings have implications for novel ways to use biomarkers with outcome prognostication in TBI.

Recently, IRB approval was granted for 30 control subjects to participate in an additional portion of the study for the purposes of obtaining blood and CSF. Dr. Wagner and fellow researchers plan to use these samples to establish baseline, or control, values for TBI-related biomarkers and hormones being evaluated, using contemporary ELISA techniques, rather than relying on literature-based control values.

These data will facilitate direct comparison of CSF sex-hormone levels in brain-injured patients and further validate conclusions drawn about injury biomarker, gender and hormonal patterns observed in patients with TBI.

With established baseline values for blood and CSF samples, continued analysis of hormone and biomarker changes (both acute and chronic) after TBI, and further trajectory analysis, a clearer picture is emerging of the role of sex hormones on outcome in traumatic brain injury.

References
Speaking of Rehab

Faculty members of the UPMC Institute for Rehabilitation and Research remain active and visible at national and international meetings. Following is a sampling of recent presentations.

American Academy of Physical Medicine and Rehabilitation 68th Annual Assembly

September 27 to 30, 2007 • Boston, Mass.

A number of UPMC IRR faculty members participated in the 68th Annual Assembly of the American Academy of Physical Medicine and Rehabilitation in Boston.

Symposium lecture

Gwendolyn A. Sowa, MD, PhD, presented a talk on "Emerging technology for the treatment of lumbar intrinsic disc pain," in an educational session at the meeting of the Physiatric Association of Spine, Sports and Occupational Rehabilitation (PASSOR).

Scientific Paper Presentation — Clinical Pearls


Poster Presentations

Intervertebral disk cells respond to different magnitudes of tensile stress with alterations in gene expression. (Sowa GA, Coelho JP, Icuu C, Georgescu H, Chu A, Kang J)

Power wheelchair lease provision in terminal illnesses: a humane and cost-effective solution to a difficult problem. (Horton JA 3rd, Schmeler MR, Bundy A, Petro T)

Course Instruction, Workshops, and Roundtable Discussions

Neurological Round Table — Agitation Roundtable Discussion. (Camilo-reddy C, Lombard L, Zafonte R)

Neuroleptic Agents: Uses and Abuses in Rehabilitation. (Elovic E, Lombard L, Zafonte R)

Paroxysmal Autonomic Overactivity Syndromes Following Acquired Brain Injury. (Baguley IJ, Zafonte RD)

Evidence-Based Practice of Spinal Cord Injury: The Latest Clinical Practice Guidelines. (Boninger M, Groah S, Sabharwal S)

Gadgets and Gizmos: Advances in Mobility. (Cooper R, Hoover R, Koontz A)

Evidence Basis for Outcome Studies in Brain Injury/Stroke, Spinal Cord Injury, and Chronic Pain. (Grabois M, Ragnarsson K, Zafonte R)

Rehabilitation Implications of Solid Organ Transplant: Issues, Complications, Implications, and Future Prospects. (Bartels M, Rashbaum I, Zafonte R)


25th Annual National Neurotrauma Symposium

July 29 to Aug. 1, 2007 • Kansas City, Mo.

Presentations

Rehabilitation Therapy: Does It Work? (Dash P, Wagner AK)

TBI — Evidence Basis for Clinical Practice and Future Venues for Research. (Zafonte RD)

Abstracts


The effect of rewarining on the acute protein kinase response after murine CCI following therapeutic hypothermia. (Jenkins LW, Kocanek PM, Dixon CE, Kline AE, Clark RSB, Alexander H)

Delayed and chronic administration of the 5HT1A receptor agonist 8-OH-PAT enhances motor function, facilitates acquisition of spatial learning, and improves memory retention after controlled cortical impact injury in adult male rats. (Kline AE, Cheng JP, Aslam HA, Luthra P, Hoffman AN, Zafonte RD, Jenkins LW, Sozda CN, Olsen AS)

The effect of rewarining on the acute protein kinase response after murine CCI following therapeutic hypothermia. (Jenkins LW, Kocanek PM, Dixon CE, Kline AE, Clark RSB, Alexander H)


Real-time continuous neural control of a 4-DOF prosthetic arm. (Perel S, Velliste M, Schwartz AB)

Human speech cortex long-term recordings [3]: neural net analyses. (Wright EJ, Andreasen DS, Bartels JL, Brumberg JS, Guenther FR, Kennedy PR, Miller L, Rebecso J, Schwartz AB, Siebert SA1, Velliste M)

Neuronal responses in somatosensory cortex to multi-channel microstimulation of primary afferent neurons. (Hokanson JA, Wagenaar JB, Weber DJ)

A computational model for selectively stimulating peripheral sensory neurons. (Bourbeau DJ, Hokanson JA, Weber DJ)

Accurate recording and nonlinear representation of hand kinematics. (Clanton ST, Spalding MC, Rohlin KD, Schwartz AB)

Hand synergies during reach-to-grasp, and the effects of object selection on principal components. (Spalding M, Schwartz AB)

Neural adaptation to 3-dimensional, rotational perturbations in a closed loop brain–computer interface. (Chase SM, Fraser GW, Schwartz AB, Kass R)

Quantifying somatosensory neuronal responses using conditional mutual information. (Wagenaar JB, Sudre GP, Ventura V, Weber DJ)

How feedback affects M1 neurons during hand movement. (Wu S, Schwartz AB)

Effects of chronic pretreatment with methylphenidate on changes in striatal dopamine neurotransmission with a single methylphenidate challenge in an experimental model of brain trauma. (Harun R, Clossin D, Dixon CE, Michael AC, Wagner AK)

Striatal dopamine transporter and D2 receptor binding and executive functioning after TBI: an initial PET study. (Scantlon JM, Price J, Ricker J, Conley Y, Becker C, Lopresti D, Drewnicki L, Deslouches S, Fabio A, Wagner AK)


Coming soon: Neuroscience 2007

Nov. 3 to 7, 2007 • San Diego, Calif.

The following abstracts have been accepted for publication or poster presentation during Neuroscience 2007 — the 37th Annual Meeting of the Society for Neuroscience this November in San Diego.

Human speech cortex long-term recordings [5]: formant frequency analyses. (Brumberg JS, Andreasen DS, Bartels JL, Guenther FR, Kennedy PR, Siebert SA, Schwartz AB, Velliste M, Wright EJ)
Notables

Dr. Boninger receives lectureship

Michael L. Boninger, MD, was invited to present the Eighth Annual Ben L. Boynton, MD Lecture in Physical Medicine and Rehabilitation October 17 at the Rehabilitation Institute of Chicago.

Dr. Boninger’s lecture was entitled, “Repetitive Strain of Shoulder and Wrist: What Can We Learn from Wheelchair Users?”

The Boynton Lectureship was established by the Boynton family in memory of Dr. Boynton and in recognition of his achievements in the field of physical medicine and rehabilitation.

The Boynton lecture series is offered through the Department of Physical Medicine and Rehabilitation at Northwestern University Feinberg School of Medicine, Chicago.

Dr. Cooper wins da Vinci Award

Rory A. Cooper, PhD, director of the Human Engineering Research Laboratories, was selected to receive the 2007 da Vinci Lifetime Achievement Award from the National Multiple Sclerosis Society Michigan Chapter and the Engineering Society of Detroit. The award was presented on September 28, 2007 at the Ritz-Carlton in Dearborn, Mich.

The da Vinci Awards recognize individuals, organizations, and corporations in the fields of engineering, construction, and technology for “innovations that empower people at all levels of ability” by employing principles of universal design.

The da Vinci Lifetime Achievement Award honors a lifetime of significant contributions to advancing accessibility.

House Committee on Veterans Affairs hears from Dr. Zafonte on TBI

Traumatic brain injury (TBI) has become “the signature injury” of the present conflicts in Iraq and Afghanistan. Of those treated at Walter Reed Army Medical Center for any kind of injury received in one of these operations, 65 percent have TBI as either a primary diagnosis or a concurrent injury.

Because of the magnitude of the problem, the House Committee on Veterans Affairs held a Traumatic Brain Injury Symposium, during which they heard testimony from family members, advocates, and medical experts including Ross D. Zafonte, DO, then chairman of the Department of Physical Medicine and Rehabilitation at UPMC.

“This issue is very dear to my heart,” Dr. Zafonte told the committee. “For the past 17 years, I have been involved in clinical care and research involving people with TBI. My work is mostly focused on developing innovative therapies for recovery.”

Dr. Zafonte’s brief remarks emphasized the importance of understanding TBI not merely in terms of the immediate insult, but as an evolving disease process that lasts well beyond the time of the initial insult, progressing over days, perhaps even weeks.

Dr. Zafonte told the committee that there is a clear clinical need for a screening process for the “mild” cases, a process that is readily exportable to the field and capable of being generalized across a broad community. Another important component is a sophisticated method of evaluation. Dr. Zafonte related that current research is at the forefront of identifying biomarkers for differential diagnosis, selection of therapeutic options, and prognostication in TBI.

“We need adaptability in a network to be able to bring clinical care and innovative programs and standards of care up to speed rather quickly. We should look to programs like the National Institute on Disability and Rehabilitation Research TBI Model Systems ... as an infrastructural component of what we want to do.

“I am hopeful that this kind of strategy will bring a new world of opportunity to those brave Americans who have given so much to our country.”
Aging, health, and women with disabilities

By Betty Y. Liu, MD
Assistant Professor of Physical Medicine and Rehabilitation

As advances in medical technology extend life expectancy, we can expect to see increases in both the absolute number and the percentage of Americans above age 65, among whom 16.9 percent of women and 9.1 percent of men report at least one type of functional limitation affecting daily life.

Multisystem changes occur with advancing age, independent of disability status, and the general trend suggests that a majority of the approximately 30 million American women with disabilities can anticipate normal longevity. In women with disabilities, however, the convergence of several factors may magnify the aging process and how it uniquely affects their health.

Evidence suggests an increased incidence of osteoporosis in a population that is already susceptible as a result of diminished weight bearing or decreased muscle activity. Moreover, many women with disabilities take medications — such as anticonvulsants, antidepressants, or long-term corticosteroids — with adverse-effect profiles that include accelerated bone resorption or impaired bone mineralization. Mobility limitations also decrease metabolism, increasing the risk of obesity, diabetes, and hypertension. Lack of resources also restricts choice in health care services, despite the enactment of the Americans with Disabilities Act of 1990. One example is apparent in many facilities that provide routine mammography: Most machines cannot be lowered to wheelchair height, and limitations in shoulder range of motion may prevent proper positioning and produce unsatisfactory views.

Anecdotal reports show that many women will tolerate suboptimal physical accessibility if the health care personnel are considerate and helpful. Attitudinal barriers, whether overt or subliminal, are sometimes the most difficult to surmount.

Economic issues are another major consideration for women with disabilities, a disproportionate number of whom occupy lower socioeconomic strata. Poverty limits options for healthy nutrition, contributing to obesity, diabetes, and hypertension. Lack of resources also restricts choice in health insurance, on which coverage for durable medical equipment, medications, and services depends.

For a variety of reasons, rates of preventive care services are lower for women with disabilities than for women without disabilities. According to a 2003 survey, for instance, among women 40 years of age and over, 65 percent of those with disabilities had received mammography services during the two years prior to the survey, compared with 71 percent of those without disabilities. Recognition of the need to improve health care for women with disabilities has led to establishment of centers that address advocacy, health, and educational issues.

The Comprehensive Healthcare Center for Women with Physical Disabilities at Magee-Women Hospital of UPMC is one of only a handful of facilities in the nation created to provide a barrier-free environment where women with physical disabilities can receive comprehensive, multidisciplinary, patient-focused health services.

When disparity in access to health care becomes obsolete, dedicated centers such as this one will not be the only places that women with disabilities can go for the health care services that many Americans take for granted.

References

Department ranks third for NIH research funding

According to data compiled by the National Institutes of Health, the Department of Physical Medicine and Rehabilitation at the University of Pittsburgh ranked fifth-highest in total NIH funding during fiscal year 2006. During the same year, the Department ranked third among the nation’s more than 50 departments of physical medicine and rehabilitation in terms of research-only NIH dollars — those awards used for direct support of original research.
Recently published

Following is a sample of recently published scholarly works by IRR faculty researchers.

**Peer-reviewed papers**


**Book chapters**


**Published abstracts**


