



## MUSCULOSKELETAL DISORDERS AND PHYSIOLOGIC CHANGES OF PREGNANCY

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**ABSTRACT** Pregnancy is a condition in which a combination of biochemical, hormonal, and vascular changes may result in a wide variety of musculoskeletal disorders. In the postpartum period, baby care may lead to specific disorders of the mother's upper limbs. Virtually all women experience some degree of musculoskeletal discomfort during pregnancy. We propose to review the main musculoskeletal disorders during pregnancy.

**KEYWORDS :** Pregnancy, Musculoskeletal, Osteoporosis, Paresthesias, Exercises

Soft tissue edema during pregnancy is reported by 80% of women, with findings most notable during the last 8 weeks of pregnancy (1). Increased fluid retention can predispose to tenosynovial swelling or nerve entrapment.

Ligamentous laxity is another physiologic change of pregnancy. It is related to the production of the hormones relaxin and estrogen. Relaxin is known to remodel pelvic connective tissue and activate the collagenolytic system. There may be a correlation between mean serum relaxin levels during pregnancy and symphyseal pain or low back pain. Relaxin levels in the blood peak at the 12<sup>th</sup> week of pregnancy and steadily decrease to around 50% of peak levels until the 17<sup>th</sup> week, after which levels stabilize for the duration of pregnancy.

Weight gain during pregnancy is universal, and combines with ligamentous laxity to increase joint discomfort. A 20% gain in weight may increase the force on a joint by as much as 100%. Hyperlordosis of pregnancy is often seen as a compensatory mechanism for an increase in pelvic tilt, as well as the biomechanical strain of the gravid uterus. The sacroiliac joints, which experience increased laxity, strain to resist these forces. Thus, there is increased mechanical strain about the sacroiliac joints, pelvis, and low back.

### Pubic Pain of Pregnancy

The physiologic and biomechanical factors of both pregnancy and delivery can contribute to pain and dysfunction of the pubic symphyseal region. Increased ligamentous laxity contributes to increased mobility at the pubic symphysis joint. In mild cases, rest and ice will relieve symptoms. The use of a pelvic binder was found to reduce both symphyseal angle and pain (2).

Osteitis pubis occurs in pregnant and postpartum women. It is a process in which bone around the symphysis is resorbed, with subsequent reossification. It usually presents as symphyseal pain that is gradual in onset, followed by rapidly evolving intense pain radiating down both thighs, exacerbated by movement of the lower extremities. The self-limited course will gradually subside over several days to weeks. In the case of prolonged pain, bed rest followed by ambulation with a walker may be necessary. Although the use of antiinflammatory drugs is contraindicated during pregnancy, they are usually helpful in the postpartum period. Local steroid and lidocaine injections may hasten symptom resolution (3).

Symphyseal rupture is a very rare complication, usually associated with difficult labor. It is usually treated conservatively, with initial bed rest in the lateral decubitus position and a pelvic binder, followed by ambulation, and physical therapy as tolerated with a walker. Symphyseal rupture during vaginal delivery can be managed without surgery (4).

### Persistent Musculoskeletal Complaints

Traction and compression due to prolonged positioning during labor and delivery have been implicated as causes of mononeuropathies and plexopathies, peroneal nerve injury, and lumbar plexopathy. Although

there are no studies indicating a link between sedentary lifestyle and susceptibility to labor-related injury, as mentioned above, exercise may shorten the time of labor, thus decreasing the exposure to such injuries.

### Low Back Pain

Low back pain of pregnancy is common, affecting 50% of pregnant women. Etiologies are many and may include mechanical strain, pelvic ligamentous laxity, sacroiliac pain, vascular compression, spondylolisthesis, and discogenic pain.

Persistent lumbopelvic pain has been correlated to decreased activity and an increase in the incidence of depression. On history, pain is located in the lumbar or pelvic/sacroiliac region, usually worsened with weight bearing and activity, and use of a supportive pillow. This may be associated with vague pain in the inguinal region or the proximal lower extremities. True radicular pattern of pain radiation is rare.

Physical examination should include a standard neuromuscular examination with a thorough neurologic assessment to rule out nerve compression. A step-off sign may indicate spondylolisthesis, although this is often an incidental finding. Most patients with low back pain respond to activity and postural modifications, scheduled rest, and exercise. Lumbar support binders may also provide pain relief. Studies demonstrate reduction in pain scores and improvement of activities of daily living. No adverse hemodynamic effects to the fetus or mother have been demonstrated (5).

Medication should be administered in close coordination with the obstetrician. Acetaminophen is appropriate. Nonsteroidal anti-inflammatory drugs (NSAIDs) are contraindicated due to the risk of early closure of the ductus arteriosus. Other class B drugs (no evidence of risk in humans) include cyclobenzaprine, oxycodone (used in low doses and not near term), and prednisone. There is currently no literature on epidural injections. Fluoroscopic guidance is contraindicated; therefore, such injections should be performed by experienced providers who can administer without fluoroscopy.

Lumbar disk herniation is rare, estimated to account for one in 10000; in the presence of cauda equina or progressive neurologic deficit, corrective surgery has been documented in the literature (6).

### Hip Pain

During pregnancy, hip pain can be indicative of low back or pelvic girdle pathology. It is also possible for intra-articular hip pain to refer to the pelvis and lower back. Misdiagnosis is a risk; a careful physical examination must be performed to ascertain the appropriate differential diagnosis (7).

Two rare but concerning causes of localized hip pain are transient avascular necrosis and osteoporosis. Avascular necrosis of the femoral head may be due to weight gain, as well as hormonal changes in the context of increased interosseous pressures. Generally, symptoms

occur during the third trimester, and include pain with weight bearing located in the hip, pelvis, or groin, intermittently radiating to the knee. Diagnosis is confirmed with x-ray or magnetic resonance imaging (MRI), and weight bearing is restricted to prevent progression. This condition may require further intervention after delivery.

Early diagnosis of osteoporosis is important. Plain anteroposterior x-ray imaging of the hip, with proper shielding, may demonstrate osteoporotic changes with a preserved joint space; however, x-rays should be avoided if possible. T2-weighted magnetic resonance imaging (MRI) will show high-intensity signal in the marrow space. MRI can distinguish between transient osteoporosis of pregnancy and avascular necrosis of the hip. Weight bearing precautions should be undertaken to protect the patient from fracture, which may require surgical intervention, and can cause long-term complications. Treatment with antiresorptive agents, such as calcitonin and bisphosphonates, may shorten duration of symptoms. Use of bisphosphonates is controversial due to pregnancy, as they have been associated with reports of decreased fetal bone growth. There are no reports of congenital abnormalities in animal studies from bisphosphonates. Full recovery is expected if the osteoporosis does not predate the pregnancy (8).

### Transient Osteoporosis of Pregnancy

Osteoporosis can also contribute to rib fractures, vertebral fractures, and sacral and tibial stress fractures. In the absence of osteoporotic findings, changes in biomechanical loading patterns can also contribute to sacral stress fractures, which rarely occur and are more likely in the last trimester.

### Carpal Tunnel Syndrome

Hand pain is the second most common musculoskeletal symptom of pregnancy, and carpal tunnel syndrome is a frequent cause. Carpal tunnel syndrome is experienced by 2 to 25% of women during pregnancy and is usually diagnosed in the third trimester. Peripheral edema is believed to contribute to the pathophysiology. Symptoms include pain and paresthesias in the first three digits and are usually worse at night or during the day with repetitive flexion or extension of the wrist. Nonsurgical management is favored, as most women experience spontaneous relief after delivery; 95% of women are asymptomatic within 2 weeks postpartum.

If symptoms warrant treatment, night time thermoplastic splinting for 2 weeks has been reported to alleviate symptoms for 80% of women, with one study corroborating clinical improvement with objective physiologic data. Severe, refractory symptoms have been shown to respond to steroid injections. Surgery is rarely warranted, and is recommended only in cases of severe symptoms with abnormal nerve conduction studies (9).

### Meralgia Paresthetica

Meralgia paresthetica is the entrapment of the lateral femoral cutaneous nerve, a pure sensory nerve passing under the inguinal ligament. Risk factors include pregnancy, diabetes, obesity, belt pressure, and anatomic variation. Symptoms can include numbness, paresthesia, or burning pain about the anterolateral thigh. The treatment is to avoid tight-fitting clothes and repetitive carrying of older children at the ipsilateral hip. In severe cases, a nerve block can be performed with ultrasound guidance. Our experience shows that symptoms usually resolve after delivery.

### De Quervain's Tenosynovitis

De Quervain's tenosynovitis is caused by inflammation of abductor pollicis longus and extensor pollicis brevis tendons, located in the dorsum of wrist. Symptoms include localized pain at the radial aspect of the wrist. This can occur in pregnancy or in postpartum. It is believed that fluid retention predisposes pregnant and lactating women. Overuse in childcare activities, particularly in breast feeding, cause and worsen symptoms. Symptoms are usually self-limited, and respond to ice, thumb spica splint, and activity modification. NSAIDs can be used in postpartum, and local corticosteroid injections have also been shown to be efficacious (10).

### Rectus Abdominis Diastasis

Separation of the rectus abdominis from the linea alba is common, occurring in up to 67% of women. Hormonal changes are implicated, as well as biomechanical strain as a result of the gravid uterus exerting pressure on the muscles of the abdominal wall. This is rarely a cause of

functional limitation, and surgical correction is limited to cosmetic indications.

### SUMMARY

Virtually all women experience some degree of musculoskeletal discomfort during pregnancy with 25% having disabling symptoms. Additionally, many women develop musculoskeletal disorders postpartum due to the continued hormonal influences of lactation on the musculoskeletal system and the biomechanical and ergonomic stresses of child-care-related activities.

Accurate and prompt diagnosis and comprehensive management are important for a good outcome and prevention of chronic pain and disability. Prognosis is often good as many of the conditions are self-limited. Treatment often includes a combination of local injections, bracing, therapeutic exercise, manual therapy, and functional rehabilitation. Reassurance and patient education are critical.

Women can perform moderate exercise during pregnancy without anticipated harm to fetus or mother. Collision sports should be avoided. More research is needed on the safety of very high intensity exercise.

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