Lower Extremity Nerve Injury in Childbirth: AWHONN Practice Brief Number 11

Recommendations

1. Nurses and other maternity care providers should encourage frequent position changes for women in labor, especially during the second stage of labor, to prevent lower extremity nerve injury (LENI). This includes avoidance of prolonged flexion of knees or hips, particularly at greater than ninety degrees (lithotomy, squatting, kneeling) and deep tissue pressure (fingertips, bed, or stirrups) laterally below the knees or on the posterior thighs.

2. Nurses who care for women in the postpartum period should be alert to symptoms of LENI and should provide timely interventions.

Background

Lower extremity nerve injury occurs when nerves are compressed or stretched. Duration and intensity of the pressure and/or stretch affect the extent of nerve damage (Bunch & Hope, 2014). These injuries are uncommon, but their effect on women after birth can be devastating. Symptoms vary based on the affected nerve and may include numbness, paresthesia, pain, and loss of muscle function that causes an inability to bear weight or walk. Impairments can be unilateral or bilateral. Lower extremity nerve injury generally resolves within 2 to 6 months, although symptoms may persist for years or be permanent (Haller et al., 2017; O’Neal et al., 2015; Tournier et al., 2019).

The true incidence of LENI is believed to be underestimated in part because women with mild symptoms or whose symptoms abate quickly are not likely to be referred to a specialist. Misdiagnosis and loss to follow-up also make the incidence difficult to determine (Haller et al., 2017; Madson, 2014; Richard et al., 2017). Among the five studies on LENI conducted worldwide since 2002, researchers reported various incidence rates: 0.3% (Tournier et al., 2019), 0.6% (Dar et al., 2002), 0.92% (Wong et al., 2003), 0.96% (Haller et al., 2017), and 2.3% (Richard et al., 2017). These reported rates are similar to those for shoulder dystocia (0.2%–3%); American College of Obstetricians and Gynecologists Committee on Practice Bulletins–Obstetrics, 2017), postpartum venous thrombosis (0.05%–0.2%; American College of Obstetricians and Gynecologists Committee on Practice Bulletins–Obstetrics, 2018), and postpartum hemorrhage (3%; Reale et al., 2020). Notably, while these three complications are well-known and have associated evidence-based practice and training guidelines, LENI remains unfamiliar to many health care providers.

Lower extremity nerve injury is usually attributed to positioning, although obstetric and anesthesia factors can be implicated as well (Madson, 2014; Wong, 2010). It can occur during gynecologic and other surgeries (Abdalmageed et al., 2017) and during cesarean and vaginal birth (Butchart et al., 2012; Haller et al., 2017; Richard et al., 2017). While LENI during vaginal birth occurs more commonly with neuraxial analgesia, it may also occur during labor when no medications are used (Wong, 2010). Neuraxial analgesia may contribute to LENI when women cannot feel warning sensations and do not adjust their positions to ease nerve compression or stretch. The Society for Obstetric Anesthesia and Perinatology (2020) encouraged the use of non-motor blocking epidural analgesia (low-dose) for labor, which allows as much movement as possible while providing pain relief.

In typical pushing positions, women pull back their thighs and externally rotate and abduct their hips. This can compress the femoral nerve under the inguinal ligament (Madson, 2014; Richard et al., 2017; Wong, 2010). Another commonly injured nerve, the peroneal nerve, can be injured in several ways at different locations. Most often, it is stretched or compressed with sustained knee flexion or hyperflexion from squatting, kneeling, lithotomy position, or stirrups (Hashim & Addekanmi, 2007; Sahai-Srivastava & Amezcua, 2007). Women usually hold back their legs at the lateral knee area or their support persons or nursing staff may help...
them to do so. At this time, deep, prolonged pressure just below the lateral flexed knee at the fibular head where the peroneal nerve is superficial can cause injury (Radawski et al., 2011). Peroneal nerve damage can occur at the same lateral knee location when women rest their legs or lean their legs against bedrails, stirrups, or other hard objects (Sahai-Srivastava & Amezca, 2007).

Intrapartum Strategies to Prevent LENI

The key to prevent nerve injuries during labor is frequent readjustment of hand and leg positions, which helps prevent continuous pressure or stretch. Recommendations for the intrapartum period include the following:

1. Avoid hyperflexion greater than 90 degrees of knees and thighs (especially with abduction and external rotation of hips), other than for emergent use of McRoberts maneuver for shoulder dystocia. After each pushing cycle or McRoberts maneuver, reposition the woman’s legs in a neutral, relaxed, or flat position.
2. Ensure women are repositioned often (every 10–15 minutes) during the second stage of labor.
3. Avoid the lithotomy position and/or stirrups except as needed for birth. When stirrups are used, ensure the woman’s thighs are not flexed more than 90 degrees and prevent hyperabduction of the thighs (frog leg position).
4. Ensure that the women’s legs do not lean against hard surfaces, including but not limited to bed, side rails, and the edge of stirrups.
5. Rotate hand positions and ensure that no deep, prolonged pressure from fingertips is applied, especially at the lateral knee area and the posterior thigh area. Encourage the woman to position her hands flat while holding her legs back.
6. Document specific positions and times of position changes, particularly during the second stage of labor.

When neuraxial analgesia is used, it should be non-motor blocking to allow women to move their legs and to retain some sensation. The use of low concentration local anesthetic solutions is not associated with a prolonged duration of the second stage of labor or an increased instrumental birth rate and is recommended by the Society for Obstetric Anesthesia and Perinatology (2020).

Care After Birth

Women may identify and report symptoms after birth, and if neuraxial analgesia was used, after numbness has worn off. Women with LENI may be unable to bear weight or walk because of quadriceps weakness, foot drop, impaired gait, numbness, and/or pain. Recommendations for the postpartum period include the following:

1. Be alert for unusual lower extremity sensory or motor symptoms, such as paresthesia, numbness, pain, weakness, or loss of function.
2. Immediately notify maternity care providers, including anesthesia personnel, if neuraxial analgesia was used.
3. Implement fall precautions and ensure the woman has assistance when moving out of bed (preferably with a gait belt). Consider using a standardized, validated fall risk scoring tool and whenever possible a tool specific to an obstetric population (Hale et al., 2020).
4. Arrange for mobility and other aids as needed, including but not limited to wheelchair, walker, cane, leg/foot braces, and shower chair. Ensure the woman is discharged with necessary assistive devices or mobility aids.
5. Develop a discharge plan that includes home care if needed because women who experience LENI often cannot safely walk or care for their newborns without assistance.
6. Request consultations and provide information for follow up referrals for neurology and physical therapy staff as needed.
7. Care providers should answer questions and provide information and resources.

Education and Safety

Education for nurses and the entire multidisciplinary maternity care team should include the following:

1. Explanation about LENI, how it occurs, and how it can be prevented.
2. Emphasis on the importance of non-motor-blocking neuraxial analgesia.
3. Strategies to re-position women frequently during labor based on the formula Compression + Stretch + Time = Injury.
   - Avoid hyperflexion and/or hyperabduction of extremities and change positions often.
   - Rotate hand positions and prevent deep tissue compression.
4. Thorough and precise documentation of labor positions, particularly during the second stage of labor.
5. Appropriate provider response to reports of LENI symptoms:
   - Promptly notify providers and advocate for referrals and assistive devices.
   - Document specific symptoms and impairments.
   - Educate women about the risk of maternal falls and prevent falls by assisting women out of bed with the use of ergonomic equipment.
   - Educate women about the risk of newborn drops/falls and employ strategies to support newborn safety.
   - Arrange for home care, including assistive devices, as needed.
6. Use an appropriate fall risk assessment, for example, the Obstetric Fall Risk Assessment Score.
   - This tool was created to identify all the potential fall risk factors that might be encountered during obstetric hospitalization. The tool stratifies fall risk across six categories: prior history of falls, cardiovascular, hemorrhage, neurologic function and anesthesia, motor/ activity, and medication exposure (Gaffey, 2015).

Other Considerations

1. As soon as an injury is identified, care providers from all disciplines who were present during the second stage of labor should debrief by reviewing the medical record and clinical events to evaluate potentially preventable contributing factors.
2. Ideally, electronic health systems should be adapted to provide areas to document specific information related to position...
changes during labor (especially the second stage), including the degree of flexion for hips and knees, hand positions, and the time in each position.

Acknowledgment
AWHONN members Martha R. Sleutel, PhD, RN, CNS, C-EFM, and Cheryl Parker, DNP, CRNA, RNC-OB are acknowledged for their contributions to this practice brief.

References