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Child Health Nursing

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Neural tube defects (NTDs)

by:

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Neural tube defects (NTDs)

Serious birth defects that involve the spine or the brain.

Failure of the neural tube to close at approximately 28 days after conception.

The most common forms of NTD are:

1. spina bifida (50% of cases)
2. anencephaly (40%)
3. encephalocele (10%).

Types of spina bifida:

1. **Spina bifida occulta** is a
   - ❖ visible defect with (external saclike protrusion),
   - ❖ Least severe one.
   - ❖ Characterized by incomplete closure of one or more vertebrae without protrusion of the spinal cord or meninges.
2. **Spina bifida cystica** is a
   - ❖ visible defect with an external saclike protrusion.
   - ❖ It has two classifications: meningocele and myelomeningocele.

   Meningocele
   - ☒ (sac contains only meninges and CSF
   - ☒ produce no neurologic symptoms.

   Myelomeningocele
   - ☒ external sac contains meninges, CSF, and a portion of the spinal cord or nerve roots distal to the conus medullaris

Causes of NTDs :

1. Teratogen exposure (increases risk of congenital disorder in embryo),
2. Multiple malformation syndrome,
3. Genetic
4. Environmental factors.

During the fourth week of gestation, ventral induction of the neural tube fails to occur. The degree of impairment depends on the size and level of the defect and whether it involves the spinal cord and nerves.

The signs and symptoms of NTDs vary widely according to the type of the defect. Inspect the sacrum:

In spina bifida occulta, a depression or dimple, a small tuft of hair, a hemangioma, or a port-wine nevi in the lower lumbar or sacral area usually accompanies the defect.

Because there's no herniation of the spinal cord or meninges, spina bifida occulta usually doesn't cause neurologic dysfunction, but it's occasionally associated with foot weakness or bowel and bladder disturbances.

Sac on the back In myelomeningocele and meningocele, a saclike structure protrudes over the spine. Meningocele seldom causes neurologic symptoms.

Myelomeningocele is associated with permanent neurologic symptoms, such as flaccid or spastic paralysis; bowel and bladder incontinence; clubfoot; knee contractures; hydrocephalus and, possibly, mental retardation; and curvature of the spine.

Diagnostic tests include the following:

1. Alpha-fetoprotein (AFP) screening at 16 to 18 weeks' gestation.
2. Amniocentesis may reveal the presence of AFP in the amniotic fluid.
3. Ultrasound may be used to detect open NTDs or ventral wall defects.
4. Transillumination of a protruding spinal sac can sometimes distinguish between myelomeningocele (in which the sac transilluminates) and meningocele (in which the sac doesn't transilluminate).
    - Skull X-rays and CT scans identify the defects.

Complications of NTDs include

1. decreased motor activity below the defect,
2. paralysis,
3. multiple musculoskeletal deficits,
4. neurogenic bladder and bowel,
5. CNS infections,
6. hydrocephalus,
7. death.
8. Allergic reactions can range from mild signs and symptoms to anaphylactic shock.

Treatment

Immediate surgical closure (within 48 hours) is treatment of choice

Spina bifida occulta usually requires no surgery.

The rationale for early surgical closure is to decrease the risk of

- infection,
- morbidity, and mortality
- prevent further spinal cord and spinal nerve damage.

Surgery doesn't reverse neurologic deficits.

Nursing interventions

begin prenatally and, after the child is born, continue with preoperative and postoperative care.

Prenatally care focuses on

1. educating and supporting the parents:
2. Refer the prospective parents to a genetic counselor.
3. Inform women of childbearing age to take a folic acid supplement until menopause or the end of childbearing potential.
4. Provide psychological support to help the parents accept the diagnosis and prognosis.

Preoperative care (Before surgery) focus on

1. Preventing complications associated with the sac:
2. Prevent sac drying by covering with warmed saline soaked sterile dressings
3. Check for leakage from the sac,
4. Monitor for redness and infection around the sac,
5. Assess for signs and symptoms of CNS infection.
6. Assess for sensory and motor activity below the sac, including bowel and bladder function.
7. No pressure, please
8. Prevent trauma by keeping pressure off the sac; keep the child on his abdomen with hips flexed and legs abducted.

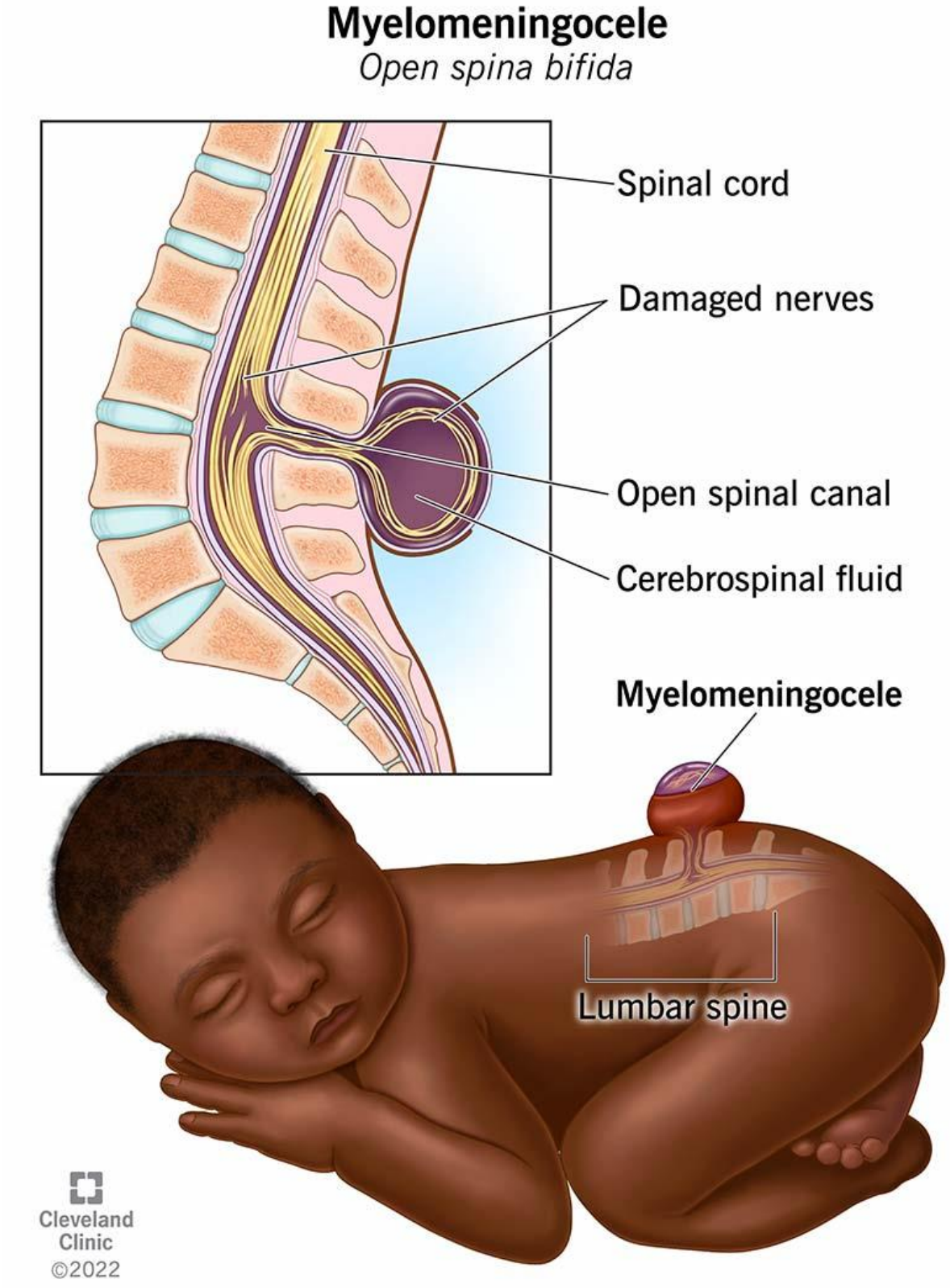
- Institute measures to keep the sac free from infection; avoid contamination from urine and stool. (A "mud flap" can be made using a strip of plastic with adhesive backing on the top portion; this is placed directly below the defect and will prevent contamination from stool.)
- Measure head circumference to establish baseline data.
- Provide emotional support to the parents.

Be aware that surgery is usually performed 24 to 48 hours after birth.

- Teach parents and other family members about measures to prevent contractures, pressure ulcers, urinary tract infections, and other complications.

Postoperative care After surgery, provide routine postoperative care, including

- monitoring vital signs, positioning, and observation of the operative site.
- Provide thorough skin care if paralysis is present (to prevent complications such as pressure ulcers).
- Infant may be positioned on side (with order) or abdomen.
- Assess motor activity and bowel and bladder function to compare with the preoperative condition.
- Measure head circumference daily, and perform ROM exercises.
- Teach clean intermittent catheterization to parents.
- Maintain splints, braces, and casts; use wheelchairs, walkers, and other assistive devices as needed


Myelomeningocele
Open spina bifida
Spinal cord
Damaged nerves
Open spinal canal
Cerebrospinal fluid
Myelomeningocele
Lumbar spine
Cleveland Clinic
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Some examples of NTDs are spina bifida, anencephaly, and encephalocele.