

Birth injuries

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BACKGROUND.

- Birth injury is defined by the National Vital Statistics Report as “an impairment of the infant's body function or structure due to adverse influences that occurred at birth.” Injury may occur antenatally, intrapartum, or during resuscitation, and may be avoidable or unavoidable.

B. Risk factors.

- When fetal size, immaturity, or malpresentation complicate delivery, the normal intrapartum compressions, contortions, and forces can lead to injury in the newborn, including hemorrhage and fracture. Obstetrical instrumentation may increase the mechanical forces, amplifying or inducing a birth injury. Breech presentation carries the greatest risk of injury. However, cesarean delivery without labor does not prevent all birth injuries. The following factors may contribute to an increased risk of birth injury:

1. Primiparity.
2. Small maternal stature.
3. Maternal pelvic anomalies.
4. Prolonged or unusually rapid labor.
5. Oligohydramnios.
6. Malpresentation of the fetus.
7. Use of mid-forceps or vacuum extraction.
8. Versions and extraction.
9. Very low birth weight or extreme prematurity.
10. Fetal macrosomia or large fetal head.
11. Fetal anomalies.

Evaluation.

- A newborn at risk for birth injury should have a thorough examination, including a detailed neurologic evaluation. Newborns who require resuscitation after birth should be evaluated, as occult injury may be present. Particular attention should be paid to symmetry of structure and function, cranial nerves, range of motion of individual joints, and integrity of the scalp and skin.

TYPES OF BIRTH TRAUMA

A. Head and neck injuries

- Injuries associated with intrapartum fetal monitoring. Placement of an electrode on the fetal scalp or presenting part for fetal heart monitoring occasionally causes superficial abrasions or lacerations. These injuries require minimal local treatment, if any. Facial or ocular trauma may result from a malpositioned electrode. Rarely, abscesses form at the electrode site. Hemorrhage is a rare complication of fetal blood sampling.
- Extracranial hemorrhage

. Caput succedaneum

- Caput succedaneum is a commonly occurring subcutaneous, extraperiosteal fluid collection that is occasionally hemorrhagic. It has poorly defined margins and can extend over the midline and across suture lines. It typically extends over the presenting portion of the scalp, and is usually associated with molding.

- ii. The lesion usually resolves spontaneously without sequelae over the first several days after birth. It rarely causes significant blood loss or jaundice. There are rare reports of scalp necrosis with scarring.
- iii. Vacuum caput is a caput succedaneum with margins well demarcated by the vacuum cup.

Cephalohematoma

- A cephalohematoma is a subperiosteal collection of blood resulting from rupture of the superficial veins between the skull and periosteum. The lesion is always confined by suture lines. It may occur in as many as 2.5% of live births.
- ii. An extensive cephalohematoma can result in significant hyperbilirubinemia. Hemorrhage is rarely serious enough to necessitate blood transfusion. Infection is also a rare complication, and usually occurs in association with septicemia and meningitis. Skull fractures have been associated with 5% to 20% of cephalohematomas. A head computed tomography (CT) scan should be obtained if neurologic symptoms are present. Most cephalohematomas resolve within 8 weeks. Occasionally, calcification may persist for several months or years.
- iii. Management is limited to observation in most cases. Incision and aspiration of a cephalohematoma may introduce infection and is contraindicated. Anemia or hyperbilirubinemia should be treated as needed.

Subgaleal hematoma

- Subgaleal hematoma is hemorrhage under the aponeurosis of the scalp. It is more often seen after vacuum- or forceps-assisted deliveries.
- . Because the subgaleal or subaponeurotic space extends from the orbital ridges to the nape of the neck and laterally to the ears, the hemorrhage can spread across the entire calvarium.
- The initial presentation typically includes pallor, poor tone, and a fluctuant swelling on the scalp. The hematoma may grow slowly or increase rapidly and result in shock. With progressive spread, the ears may be displaced anteriorly and periorbital swelling can occur. Ecchymosis of the scalp may develop. The blood is resorbed slowly and swelling gradually resolves. The morbidity may be significant in infants with severe hemorrhage who require intensive care for this lesion.
- There is no specific therapy. The infant must be observed closely for signs of hypovolemia and blood volume should be maintained as needed with transfusions. Phototherapy should be provided for hyperbilirubinemia. An investigation for a bleeding disorder should be considered. Surgical drainage should be considered only for unremitting clinical deterioration. A subgaleal hematoma associated with skin abrasions may become infected; it should be treated with antibiotics and may need drainage.

3. Intracranial hemorrhage

4. Skull fracture

- Skull fractures may be either linear, usually involving the parietal bone, or depressed, involving the parietal or frontal bones. The latter are often associated with forceps use. Occipital bone fractures are most often associated with breech deliveries.
- b. Most infants with linear or depressed skull fractures are asymptomatic unless there is an associated intracranial hemorrhage (e.g., subdural or subarachnoid hemorrhage). Occipital osteodiasis is a separation of the basal and squamous portions of the occipital bone that often results in cerebellar contusion and significant hemorrhage. It may be a lethal complication in breech deliveries. A linear fracture that is associated with a dural tear may lead to herniation of the meninges and brain, with development of a leptomeningeal cyst.
- c. Uncomplicated linear fractures usually require no therapy. The diagnosis is made by taking a skull x-ray. Head CT scan should be obtained if intracranial injury is suspected. Depressed skull fractures require neurosurgical evaluation. Some may be elevated using closed techniques.

Comminuted or large skull fractures associated with neurologic findings need immediate neurosurgical evaluation. If leakage of cerebrospinal fluid from the nares or ears is noted, antibiotic therapy should be started and neurosurgical consultation obtained. Follow-up imaging should be performed at 8 to 12 weeks to evaluate possible leptomeningeal cyst formation.

Facial or mandibular fractures

- Facial fractures can be caused by numerous forces including natural passage through the birth canal, forceps use, or delivery of the head in breech presentation.
- b. Fractures of the mandible, maxilla, and lacrimal bones warrant immediate attention. They may present as facial asymmetry with ecchymoses, edema, and crepitance, or respiratory distress with poor feeding. Untreated fractures can lead to facial deformities with subsequent malocclusion and mastication difficulties. Treatment should begin promptly because maxillary and lacrimal fractures begin to heal within 7 to 10 days and mandibular fractures start to repair at 10 to 14 days. Treated fractures usually heal without complication.
- c. Airway patency should be closely monitored. A plastic surgeon or otorhinolaryngologist should be consulted immediately and appropriate radiographic studies obtained. Head CT scan or magnetic resonance imaging (MRI) may be necessary to evaluate for retro-orbital or cribriform plate disruption. Antibiotics should be administered for fractures involving the sinuses or middle ear.

Nasal injuries

- Nasal fracture and dislocation may occur during the birth process. The most frequent nasal injury is dislocation of the nasal cartilage, which may result from pressure applied by the maternal symphysis pubis or sacral promontory. The incidence of dislocation is <1%.
- b. Infants with significant nasal trauma develop respiratory distress. Similar to facial fractures, nasal fractures begin to heal in 7 to 10 days and must be treated promptly. Rapid healing usually occurs once treatment is initiated. If treatment is delayed, deformities are common.
- c. A misshapen nose may appear dislocated. To differentiate dislocation from a temporary deformation, compress the tip of the nose. With septal dislocation, the nares collapse and the deviated septum is more apparent. With a misshapen nose, no nasal deviation occurs. Nasal edema from repeated suctioning may mimic partial obstruction. Patency can be assessed with a cotton wisp under the nares. Management involves protection of the airway and otorhinolaryngology consultation.
- d. If nasal dislocations are left untreated, there is an increased risk of long-term septal deformity.

7. Ocular injuries

- Retinal and subconjunctival hemorrhages are commonly seen after vaginal delivery. They result from increased venous congestion and pressure during delivery. Malpositioned forceps can result in ocular and periorbital injury including hyphema, vitreous hemorrhage, lacerations, orbital fracture, lacrimal duct or gland injury, and disruption of Descemet's membrane of the cornea (which can lead to astigmatism and amblyopia).
- b. Retinal hemorrhages usually resolve within 1 to 5 days. Subconjunctival hemorrhages resorb within 1 to 2 weeks. No long-term complications usually occur. For other ocular injuries, prompt diagnosis and treatment are necessary to ensure a good long-term outcome.
- c. Management. Prompt ophthalmologic consultation should be obtained.

8. Ear injuries

- Ears are susceptible to injury, particularly with forceps application. More significant injuries occur with fetal malposition. Abrasions, hematomas, and lacerations may develop.

- b. Abrasions generally heal well with local care. Hematomas of the pinna may lead to the development of a “cauliflower” ear; lacerations may result in perichondritis. Temporal bone injury can lead to middle and inner ear complications, such as hemotympanum and ossicular disarticulation.\
- c. Hematomas of the pinna should be drained to prevent clot organization and development of cauliflower ear. If the cartilage and temporal bone are involved, an otolaryngologist should be consulted. Antibiotic therapy may be required.

9. Sternocleidomastoid

- Sternocleidomastoid (SCM) injury is also referred to as congenital or muscular torticollis. The etiology is uncertain. The most likely cause is a muscle compartment syndrome resulting from intrauterine positioning. Torticollis can also arise during delivery as the muscle is hyperextended and ruptured, with development of a hematoma and subsequent fibrosis and shortening.
- b. Torticollis may present at birth with a palpable 1 to 2 cm mass in the SCM region and head tilt to the side of the lesion. More often it is noted at 1 to 4 weeks of age. Facial asymmetry may be present along with hemihypoplasia on the side of the lesion. Prompt treatment may lessen or correct the torticollis.
- c. Other conditions may mimic congenital torticollis and should be ruled out. These include cervical vertebral anomalies, hemangioma, lymphangioma, and teratoma.
- d. Treatment is initially conservative. Stretching of the involved muscle should begin promptly and be performed several times per day. Recovery typically occurs within 3 to 4 months in approximately 80% of cases. Surgery is needed if torticollis persists after 6 months of physical therapy.
- e. In up to 10% of patients with congenital torticollis, congenital hip dysplasia may be present. A careful hip examination is warranted with further evaluation as indicated.

10. Pharyngeal injury

- Minor submucosal pharyngeal injuries can occur with postpartum bulb suctioning. More serious injury, such as perforation into the mediastinal or pleural cavity, may result from nasogastric or endotracheal tube placement. Affected infants may have copious secretions and difficulty swallowing, and it may be difficult to advance a nasogastric tube.
- b. Mild submucosal injuries typically heal without complication. More extensive trauma requires prompt diagnosis and treatment for complete resolution.
- c. The diagnosis of a retropharyngeal tear is made radiographically using water-soluble contrast material. Infants are treated with broad-spectrum antibiotics and oral feedings are withheld for 2 weeks. The contrast study is repeated to confirm healing before feeding is restarted. Infants with pleural effusions may require chest tube placement. Surgical consultation is obtained if the leak persists or the perforation is large.

B. Cranial nerve, spinal cord, and peripheral nerve injury

1. Cranial nerve injuries

- **Facial nerve injury** (cranial nerve VII)
- Injury to the facial nerve is the most common peripheral nerve injury in neonates, occurring in up to 1% of live births. The exact incidence is unknown, as many cases are subtle and resolve readily. The etiology includes compression of the facial nerve by forceps (particularly midforceps), pressure on the nerve secondary to the fetal face lying against the maternal sacral promontory, or, rarely, from pressure of a uterine mass (e.g., fibroid).ii. Facial nerve injury results in asymmetric crying facies.

- Central facial nerve injury occurs less frequently than peripheral nerve injury. Paralysis is limited to the lower 1/2 to 2/3 of the contralateral side, which is smooth with no nasolabial fold present. The corner of the mouth droops. Movement of the forehead and eyelid is unaffected.
- b) Peripheral injury involves the entire side of face and is consistent with a lower motor neuron injury. The nasolabial fold is flattened and the mouth droops on the affected side. The infant is unable to wrinkle the forehead and close the eye completely. The tongue is not involved.
- c) Peripheral nerve branch injury results in paralysis that is limited to only one group of facial muscles: the forehead, eyelid, or mouth.
- . Differential diagnosis includes Mobius syndrome (nuclear agenesis), intracranial hemorrhage, congenital hypoplasia of the depressor anguli oris muscle, congenital absence of facial muscles or nerve branches.
- The prognosis of acquired facial nerve injury is excellent with recovery usually complete by 3 weeks. Initial management is directed at prevention of corneal injuries by using artificial tears and protecting the open eye by patching. Electromyography may be helpful to predict recovery or potential residual effects. Because full recovery is likely, surgical intervention should not be considered within the first year.

b. Recurrent laryngeal nerve injury

- **Unilateral abductor paralysis** may be caused by recurrent laryngeal injury secondary to excessive traction on the fetal head during breech delivery or lateral traction on the head with forceps. The left recurrent laryngeal nerve is involved more often because of its longer course. Bilateral recurrent laryngeal nerve injury can be caused by trauma, but is usually due to hypoxia or brain-stem hemorrhage.
- ii. A neonate with unilateral abductor paralysis is often asymptomatic at rest, but has hoarseness and inspiratory stridor with crying. Unilateral injury is occasionally associated with hypoglossal nerve injury, and presents with difficulty with feedings and secretions. Bilateral paralysis usually results in stridor, severe respiratory distress, and cyanosis.
- iii. Differential diagnosis of symptoms similar to unilateral injury includes congenital laryngeal malformations. Particularly with bilateral paralysis, intrinsic central nervous system (CNS) malformations must be ruled out, including Chiari malformation and hydrocephalus. If there is no history of birth trauma, cardiovascular anomalies and mediastinal masses should be considered.
- iv. The diagnosis can be made using direct or flexible fiberoptic laryngoscopy. A modified barium swallow and speech pathology consultation may be helpful to optimize feeding. Unilateral injury usually resolves by 6 weeks of age without intervention and treatment. Bilateral paralysis has a variable prognosis; tracheostomy may be required.

2. Spinal cord injuries

- Vaginal delivery of an infant with a hyperextended head or neck, breech delivery, and severe shoulder dystocia are risk factors for spinal cord injury. However, significant spinal cord injuries are rare. Injuries include spinal epidural hematomas, vertebral artery injuries, traumatic cervical hematomyelia, spinal artery occlusion, and transection of the cord.
- b. Spinal cord injury presents in four ways:
- Some infants with severe high cervical or brain-stem injury present as stillborn or in poor condition at birth, with respiratory depression, shock, and hypothermia. Death generally occurs within hours of birth.
- ii. Infants with an upper or midcervical injury present with central respiratory depression. They have lower extremity paralysis, absent deep tendon reflexes and absent sensation in the lower half of the body, urinary retention, and constipation. Brachial plexus injury may be present.

- iii. Injury at the seventh cervical vertebra or lower may be reversible. However, permanent neurologic complications may result, including muscle atrophy, contractures, bony deformities, and constant micturition.
- iv. Partial spinal injury or spinal artery occlusions may result in subtle neurologic signs and spasticity.
- c. Differential diagnosis includes amyotonia congenita, myelodysplasia associated with spina bifida occulta, spinal cord tumors, and cerebral hypotonia.
- d. The prognosis depends on the severity and location of the injury. If a spinal injury is suspected at birth, efforts should focus on resuscitation and prevention of further damage. The head, neck, and spine should be immobilized. Neurology and neurosurgical consultations should be obtained. Careful and repeated examinations are necessary to help predict long-term outcome. Cervical spine radiographs, CT scan, and MRI may be helpful.

3. **Cervical nerve root injuries**

- Phrenic nerve injury (C3, 4, or 5)
- Phrenic nerve damage leading to paralysis of the ipsilateral diaphragm may result from a stretch injury due to lateral hyperextension of the neck at birth. Risk factors include breech and difficult forceps deliveries. Injury to the nerve is thought to occur where it crosses the brachial plexus. Therefore, approximately 75% of patients also have brachial plexus injury. Occasionally, chest tube insertion or surgery injures this nerve.
- ii. Respiratory distress and cyanosis are often seen. Some infants present with persistent tachypnea and decreased breath sounds at the lung base. There may be decreased movement of the affected hemithorax. Chest radiographs may show elevation of the affected diaphragm, although this may not be apparent if the infant is on continuous positive airway pressure (CPAP) or mechanical ventilation. If the infant is breathing spontaneously and not on CPAP, increasing atelectasis may develop. The diagnosis is confirmed by ultrasonography or fluoroscopy that shows paradoxical (upward) movement of the diaphragm with inspiration.
- iii. Differential diagnosis includes cardiac, pulmonary, and other neurologic causes of respiratory distress. These can usually be evaluated by a careful examination and appropriate imaging. Congenital absence of the nerve is rare.
- iv. The initial treatment is supportive. CPAP or mechanical ventilation may be needed, with careful airway care to avoid atelectasis and pneumonia. Most infants recover in 1 to 3 months without permanent sequelae. Diaphragmatic plication is considered in refractory cases. Phrenic nerve pacing is possible for bilateral paralysis.

b. **Brachial plexus injury**

- The incidence of brachial plexus injury ranges from 0.1% to 0.2% of all births. The cause is excessive traction on the head, neck, and arm during birth. Risk factors include macrosomia, shoulder dystocia, malpresentation, and instrumented deliveries. Injury usually involves the nerve root, especially where the roots come together to form the nerve trunks of the plexus.
- ii. Duchenne-Erb palsy involves the upper trunks (C5, C6, and occasionally C7) and is the most common type of brachial plexus injury, accounting for approximately 90% of cases. Total brachial plexus palsy occurs in some cases and involves all roots from C5 to T1. Klumpke palsy involves C7/C8 to T1 and is the least common.
- a) Duchenne-Erb palsy. The arm is typically adducted and internally rotated at the shoulder. There is extension and pronation at the elbow and flexion of the wrist and fingers in the characteristic “waiter's tip” posture. The deltoid, infraspinatus, biceps, supinator and brachioradialis muscles, and the extensors of the wrist and fingers may be weak or paralyzed. The Moro, biceps, and radial reflexes are absent on the affected side. The grasp reflex is intact. Sensation is variably affected. Diaphragm paralysis occurs in 5% of cases.

- b) Total brachial plexus injury. Accounts for approximately 10% of all cases. The entire arm is flaccid. All reflexes, including grasp, and sensation, are absent. If sympathetic fibers are injured at T1, Horner syndrome may be seen.
- c) Klumpke palsy. The rarest of the palsies, accounting for <1% of brachial plexus injuries. The lower arm paralysis affects the intrinsic muscles of the hand and the long flexors of the wrist and fingers. The grasp reflex is absent. However, the biceps and radial reflexes are present. There is sensory impairment on the ulnar side of the forearm and hand. Because the first thoracic root is usually injured, its sympathetic fibers are damaged, leading to an ipsilateral Horner syndrome.
- iii. Differential diagnosis includes a cerebral injury, which usually has other associated CNS symptoms. Injury of the clavicle, upper humerus, and lower cervical spine may mimic a brachial plexus injury.
- iv. Radiographs of the shoulder and upper arm should be performed to rule out bony injury. The chest should be carefully examined to detect diaphragm paralysis. Initial treatment is conservative. Physical therapy and passive range of motion exercises prevent contractures. These should be started at 7 to 10 days when the postinjury neuritis has resolved. "Statue of Liberty" splinting should be avoided as contractures in the shoulder girdle may develop. Wrist and digit splints may be useful.
- v. The prognosis for full recovery varies with the extent of injury. If the nerve roots are intact and not avulsed, the prognosis for full recovery is excellent (>90%). Notable clinical improvement in the first 2 weeks after birth indicates that normal or near-normal function will return. Most infants recovery fully by 3 months of age. In those with slow recovery, electromyography and nerve-conduction studies may distinguish an avulsion from a stretch injury.

C. Bone injuries

- Clavicular fracture is the most commonly injured bone during delivery, occurring in up to 3% newborns. Up to 40% of clavicular fractures are not identified until after discharge from the hospital.
- a. These fractures are seen in vertex presentations with shoulder dystocia or in breech deliveries when the arms are extended. Macrosomia is a risk factor.
- b. A greenstick or incomplete fracture may be asymptomatic at birth. The first clinical sign may be a callus at 7 to 10 days of age. Signs of a complete fracture include crepitus, palpable bony irregularity, and spasm of the SCM. The affected arm may have a pseudoparalysis because motion causes pain.
- c. Differential diagnosis includes fracture of the humerus or a brachial plexus palsy.
- d. A clavicular fracture is confirmed by chest x-ray. If the arm movement is decreased, the cervical spine, brachial plexus, and humerus should be assessed. Therapy should be directed at decreasing pain with analgesics. The infant's sleeve should be pinned to the shirt to limit movement until the callus begins to form. Complete healing is expected.

2. Long bone injuries

- Humeral fractures
- Humeral fractures typically occur during a difficult delivery of the arms in the breech presentation and/or of the shoulders in vertex. Direct pressure on the humerus may also result in fracture.
- ii. A greenstick fracture may not be noted until the callus forms. The first sign is typically loss of spontaneous arm movement, followed by swelling and pain on passive motion. A complete fracture with displaced fragments presents as an obvious deformity. X-ray confirms the diagnosis.
- iii. Differential diagnosis includes clavicular fracture and brachial plexus injury.

- iv. The prognosis is excellent with complete healing expected. Pain should be treated with analgesics.
- a) A fractured humerus usually requires splinting for 2 weeks. Displaced fractures require closed reduction and casting. Radial nerve injury may be seen.
- b) Epiphyseal displacement occurs when the humeral epiphysis separates at the hypertrophied cartilaginous layer of the growth plate. Severe displacement may result in significant compromise of growth. The diagnosis can be confirmed by ultrasonography because the epiphysis is not ossified at birth. Therapy includes immobilization of the limb for 10 to 14 days.

b. Femoral fractures

- Femoral fractures usually follow a breech delivery. Infants with congenital hypotonia are at increased risk.
- ii. Physical examination usually reveals an obvious deformity of the thigh. In some cases, the injury may not be noted for a few days until swelling, decreased movement, or pain with palpation develop. The diagnosis is confirmed by x-ray.
- iii. Complete healing without limb shortening is expected.
- a) Fractures, even if unilateral, should be treated with traction and suspension of both legs with a spica cast. Casting is maintained for approximately 4 weeks.
- b) Femoral epiphyseal separation may be misinterpreted as developmental dysplasia of the hip because the epiphysis is not ossified at birth. Pain and tenderness with palpation are more likely with epiphyseal separation than dislocation. The diagnosis is confirmed by ultrasonography. Therapy includes limb immobilization for 10 to 14 days and analgesics for pain.

D. Intra-abdominal Injuries.

- Intra-abdominal birth trauma is uncommon.
- Hepatic injury
- The liver is the most commonly injured solid organ during birth. Macrosomia, hepatomegaly, and breech presentation are risk factors for hepatic hematoma and/or rupture. The etiology is thought to be direct pressure on the liver.
- b. Subcapsular hematomas are generally not symptomatic at birth. Nonspecific signs of blood loss such as poor feeding, pallor, tachypnea, tachycardia, and onset of jaundice develop during the first 1 to 3 days after birth. Serial hematocrits may suggest blood loss. Rupture of the hematoma through the capsule results in discoloration of the abdominal wall and circulatory collapse with shock. c. Differential diagnosis includes trauma to other intra-abdominal organs. d. Management includes restoration of blood volume, correction of coagulation disturbances, and surgical consultation for probable laparotomy. Early diagnosis and correction of volume loss increase survival.

2. Splenic injury

- Risk factors for splenic injury include macrosomia, breech delivery, and splenomegaly (e.g., congenital syphilis, erythroblastosis fetalis).
- b. Signs are similar to hepatic rupture. A mass is sometimes palpable in the left upper quadrant and the stomach bubble may be displaced medially on an abdominal radiograph.
- c. Differential diagnosis includes injury to other abdominal organs.
- d. Management includes volume replacement and correction of coagulation disorders. Surgical consultation should be obtained. Expectant management with close observation is appropriate if the bleeding has stopped and the patient has stabilized. If laparotomy is necessary, salvage of the spleen is attempted to minimize the risk of sepsis.
- 3. Adrenal hemorrhage

- The relatively large size of the adrenal gland at birth may contribute to injury. Risk factors are breech presentation and macrosomia. Ninety percent of adrenal hemorrhages are unilateral; 75% occur on the right.
- b. Findings on physical examination depend on the extent of hemorrhage. Classic signs include fever, flank mass, purpura, and pallor. Adrenal insufficiency may present with poor feeding, vomiting, irritability, listlessness, and shock. The diagnosis is made with abdominal ultrasound.
- c. Differential diagnosis includes other abdominal trauma. If a flank mass is palpable, neuroblastoma and Wilms tumor should be considered.
- d. Treatment includes blood volume replacement. Adrenal insufficiency may require steroid therapy. Extensive bleeding that requires surgical intervention is rare.

E. Soft tissue injuries

- Petechiae and ecchymoses are commonly seen in newborns. The birth history, location of lesions, their early appearance without development of new lesions, and the absence of bleeding from other sites help differentiate petechiae and ecchymoses secondary to birth trauma from those caused by a vasculitis or coagulation disorder. If the etiology is uncertain, studies to rule out coagulopathies and infection should be performed. Most petechiae and ecchymoses resolve within 1 week. If bruising is excessive, jaundice and anemia may develop. Treatment is supportive.
- 2. Lacerations and abrasions may be secondary to scalp electrodes and fetal scalp blood sampling or injury during birth. Deep wounds (e.g., scalpel injuries during cesarean section) may require sutures. Infection is a risk, particularly with scalp lesions and an underlying caput succedaneum or hematoma. Treatment includes cleansing the wound and close observation.
- 3. Subcutaneous fat necrosis is not usually recognized at birth. It usually presents during the first 2 weeks after birth as sharply demarcated, irregularly shaped, firm, nonpitting subcutaneous plaques or nodules on the extremities, face, trunk, or buttocks. The injury may be colorless, or have a deep-red or purple discoloration. Calcification may occur. No treatment is necessary. Lesions typically resolve completely over several weeks to months.