



A Guide to
Understanding

Brachial Plexus Injuries

Center for Pediatric Orthopaedics
at Gillette Children's Specialty Healthcare

Our Mission

Gillette Children's Specialty Healthcare meets the special health-care needs of people — primarily children and teens — who have physical and functional disabilities. Our mission is to help those we serve realize greater well-being, independence and enjoyment in life.

We combine medical, nursing, therapeutic, technical, psychosocial and other expertise in family-centered programs. We provide services at our clinics, in our hospital and throughout the region, in response to community needs and often in collaboration with other organizations. We seek to build community partnerships that help continue our mission and enhance care for people who have disabilities.

A Guide to Understanding

Brachial Plexus Injuries

Jaslyn, now 17 months old, experienced a brachial plexus injury at birth. Her injury was classified as Erb's palsy, an injury to the upper brachial plexus. At 1 week of age, Jaslyn began occupational therapy three times each week; her mother, Jennifer, also did at-home exercises with her. Therapy has improved Jaslyn's abilities. Today, she has occupational therapy once a week and continues her at-home therapy.

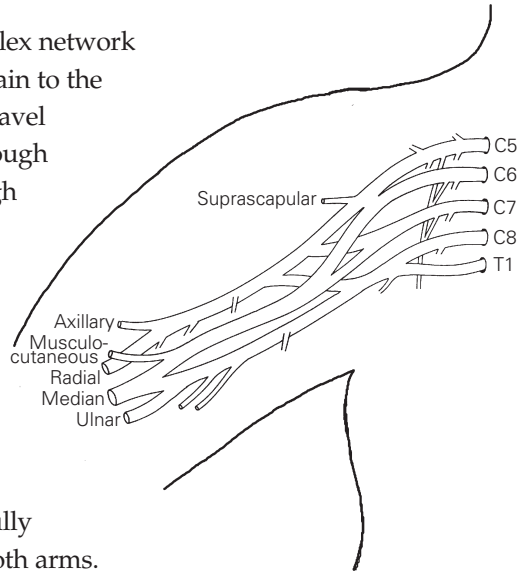


Jaslyn

About Brachial Plexus

The brachial plexus is a complex network of nerves that connects the brain to the arms and hands. Messages travel from the brain to the arm through the spinal cord, exiting through five levels of the spinal cord (cervical levels 5, 6, 7 and 8 and thoracic level 1). Those five main nerve roots create the network of nerves known as the brachial plexus.

Brachial plexus injuries can fully to partially paralyze one or both arms. Therefore, early intervention is imperative if children are to experience the best outcomes.



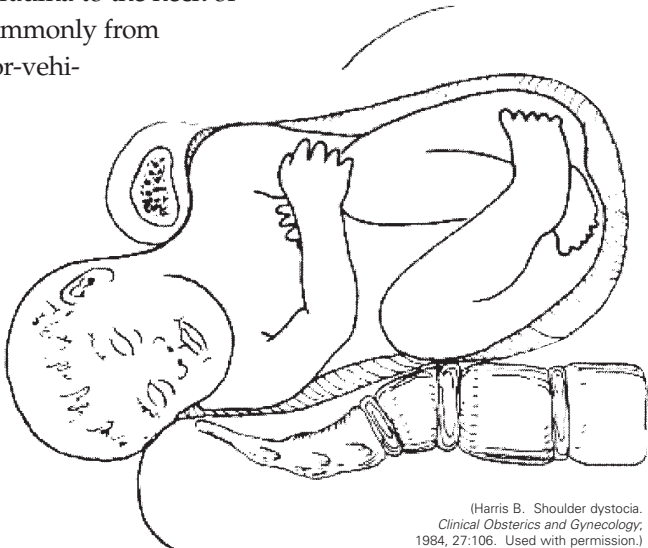
Causes of Injury

Although brachial-plexus injuries can occur at any time, most occur during birth. In fact, approximately two in 1,000 newborns experience brachial plexus injuries at birth.

Shoulder dystocia is a common cause of brachial plexus injuries in infants. Dystocia occurs when the baby's shoulders become impacted while passing through the birth canal, causing the brachial plexus nerves to stretch or tear.

Brachial plexus injuries occur often in infants who are larger than average at birth. However, newborns of all sizes — even premature babies — can experience such injuries. Tumors can put pressure on the nerves, causing brachial plexus injuries. Brachial plexus injuries in older children and adults result from trauma to the neck or shoulder region, commonly from motorcycle or motor-vehicle accidents.

During birth, the baby's neck and shoulders may stretch too far, injuring the nerves.



(Harris B. Shoulder dystocia. *Clinical Obstetrics and Gynecology*, 1984, 27:106. Used with permission.)

Symptoms

Children who have brachial plexus injuries are affected in different ways. Some children:

- Have no muscle control or feeling in the affected arm or hand
- Can move the affected arm but have little control over the wrist and hand
- Can use the affected hand, but not the shoulder or elbow muscles

Gillette's brachial plexus clinic (see page 9) sees infants who, by 3 months of age, can't:

- Squeeze someone else's fingers
- Bend and straighten their elbows
- Bend their wrists
- Raise their arms

Severe cases of brachial plexus injuries, when noted at birth, should be referred immediately to our clinic for treatment.

Diagnostic Tools

We use several tools to diagnose brachial plexus injuries, including:

- The active movement scale, an assessment that scores children's arm movements so that doctors and therapists know which of a child's muscle groups are working and what type of therapy is needed
- Electromyography (EMG), which assesses the electrical activity generated by a muscle
- Nerve-conduction studies, which measure how well the sensory and motor nerves conduct electricity
- A physical examination



Gillette's brachial plexus clinic begins treating infants immediately after diagnosis.

Treatment Options

There are two main treatments for brachial plexus injuries:

- Physical or occupational therapy exercises
- Surgery plus therapy exercises

Immediately after diagnosis, patients should begin occupational and/or physical therapy to improve range of motion. Therapists also encourage patients to use the injured arm. It's important for patients to continue therapy between appointments. Therapists can teach parents how to help children exercise at home.

Most children will regain full use of their motor function through therapy alone. For children who don't, nerve surgery can be an effective way of improving function. If children need surgery, doctors might recommend one or a combination of several surgical options discussed below.

Nerve Surgery

- In nerve-graft surgery, the sural nerve from the leg is used to reunite severed nerve ends.
- In nerve-repair surgery, a synthetic device — called a NeuraGen tube — is implanted to reconnect severed nerve ends.
- With neurolysis, the scar tissue pressing on the injured segment of the nerve is released.



Rehabilitation therapists work with brachial plexus patients on exercises that improve range of motion and encourage use of the injured arm.

Shoulder Surgery

- Tendon-transfer surgery rebalances the muscles and improves shoulder function.
- Tendon-release surgery restores normal function of the tendon(s).
- Humeral derotational osteotomy surgery realigns the upper-arm bone.

Secondary Treatments

Gillette also uses constraint therapy and botulinum toxin to treat brachial plexus injuries. Constraint therapy, used on children 18 months or older, helps to strengthen the affected arm once nerve healing is complete. Therapists restrain the uninjured arm by casting it, forcing use of the injured arm. The goal of constraint therapy is to help patients develop new movement that they otherwise might not have known was possible. Constraint therapy typically lasts three to four weeks and is often combined with occupational and/or physical therapy.

Infants who have brachial plexus injuries might develop muscle imbalances. Sometimes, when one muscle is strong, children can't develop movement in the opposing muscle. Botulinum toxin can weaken the strong muscle so that other muscles can develop.

Ann Van Heest, M.D., orthopaedic surgeon, evaluates a patient's range of motion during Gillette's brachial plexus clinic.



About Gillette

Gillette is an internationally recognized medical facility based in St. Paul, Minn. For more than 100 years, we've been at the forefront of research, education, medical technology and treatment for children and young adults who have disabilities.

We value innovation and encourage our staff to develop creative approaches to providing high-quality care. We specialize in treating patients with brain and spinal-cord injuries, cerebral palsy, craniofacial anomalies, complex orthopaedic problems, neurological disorders, rheumatological disorders, spina bifida and other disabilities.

Gillette's Center for Pediatric Orthopaedics is one of our busiest centers of care. Within it, our specialty clinics focus on several orthopaedic problems and orthopaedic-related conditions, including brachial plexus injuries.

About the Clinic

The brachial plexus clinic staff includes the following pediatric specialists:

- Neurologists
- Neurosurgeons
- Nurses
- Orthopaedic surgeons
- Physical and occupational therapists
- Rehabilitation medicine physicians
- Social workers

Working together, our team of experts can accurately identify and address each patient's needs. Several hundred patients have received care in the brachial plexus clinic since its inception in 1999.

Information & Referrals

For more information about Gillette's brachial plexus services, please call 651-229-1758 or 800-719-4040 (toll-free).

To refer a patient to our brachial plexus clinic, call 651-229-3944 or 800-719-4040 (toll-free).

LEARN MORE!

For more information about brachial plexus injuries, visit our Web site at www.gillettechildrens.org.



Centers of Excellence at Gillette

Treating people who have disabilities and complex medical conditions requires a team approach. At Gillette, our doctors, surgeons, nurses, therapists, psychologists, social workers and other specialists work together to care for patients. Throughout our centers of excellence, we offer leading-edge medical treatments tailored to the unique needs of each patient.

Gillette's centers of excellence:

- Center for Cerebral Palsy
- Center for Craniofacial Services
- Center for Gait and Motion Analysis
- Center for Pediatric Neurosciences
- Center for Pediatric Orthopaedics
- Center for Pediatric Rehabilitation
- Center for Pediatric Rheumatology
- Center for Spina Bifida



Gillette Children's
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Minnetonka Clinic
6060 Clearwater Drive
Minnetonka, MN 55343
952-936-0977
800-277-1250 (toll-free)

Burnsville Clinic
305 East Nicollet Boulevard
Burnsville, MN 55337
952-223-3400
866-881-7386 (toll-free)

Duluth Clinic
Lakewalk Center
1420 London Road
Duluth, MN 55805
218-728-6160
800-903-7111 (toll-free)

Mobile Outreach Clinic
For locations and schedules:
651-634-1938
800-578-4266 (toll-free)
www.gillettechildrens.org



Gillette Lifetime
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