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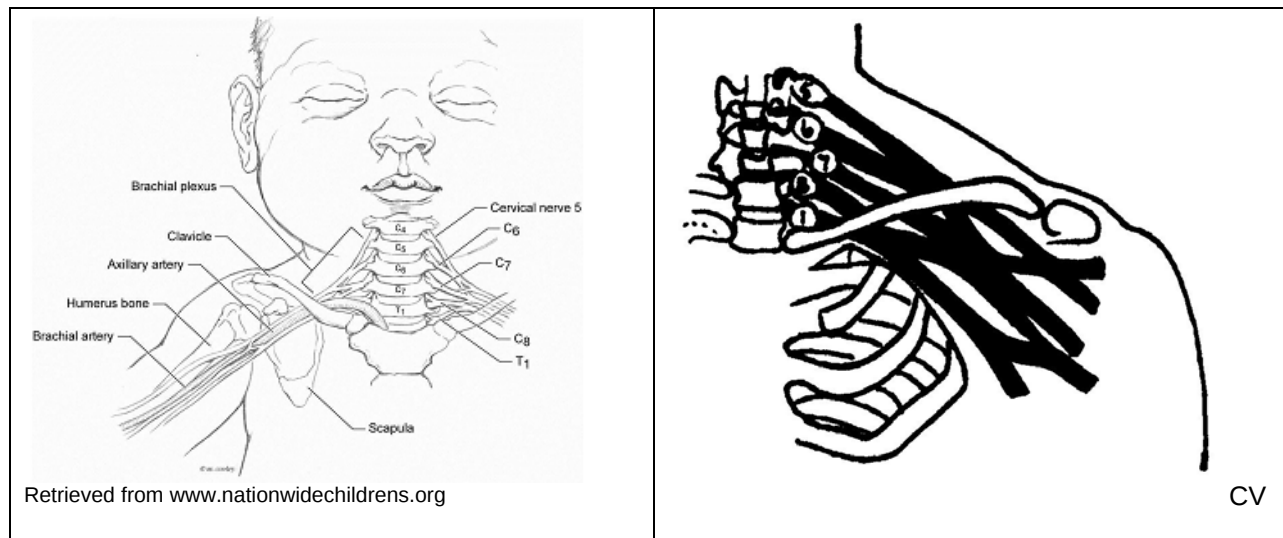
BRACHIAL PLEXUS CLINIC

INFORMATION FOR PARENTS

Your child has been diagnosed with a brachial plexus injury. This information has been prepared to help you learn more about this condition and to explain how it is managed at BC Children's Hospital. Each child with a brachial plexus problem will follow their own individual course of therapy and recovery. Questions specific to your child's condition and care should therefore be directed to your physician and therapist.

WHAT IS THE BRACHIAL PLEXUS?

Brachial plexus is the name given to a group of five large nerves that exit from the spinal cord between the bones in the neck (the vertebrae) and pass through the neck underneath the collarbone to become the major nerves of the arm at about the level of the armpit. These nerves combine into a complex pattern before dividing among the muscles and tissues of the arm providing movement and feeling to the arm. These nerves are represented by the symbols C5, C6, C7, C8 and T1.



WHAT ARE NERVES?

Nerves are like an electric cable. They are cord-like structures of tissue formed from a collection of nerve fibers. A single nerve may consist of thousands of fibers. In the arm, these fibers carry messages between the brain and muscles and tissues by way of the brachial plexus. For a muscle to work, a message must travel from the brain along a nerve that goes directly to the muscle.

HOW DO BRACHIAL PLEXUS INJURIES HAPPEN?

Difficult childbirth is the most common cause of a brachial plexus injury in infants. If the baby's body is large the shoulders can become trapped after delivery of the head. In order to free the shoulders, the head tilts or is pressed to the opposite side, stretching the nerves in the neck. Tension on the brachial plexus may cause one or more fibers of the nerves to stretch or even pull apart. Additional force on the plexus may rupture nerves entirely or unplug them from the spinal cord. If the brachial plexus is damaged, weakness in the arm shows up immediately as a paralysis of that part of the arm.

WHAT HAPPENS WHEN THERE IS AN INJURY TO THE BRACHIAL PLEXUS?

There are many degrees of severity in brachial plexus injuries. The first consideration is the amount of injury to the nerve. If the fibers have only been overstretched and not torn, your child should recover complete use of the muscle over the course of a few weeks. However, if the nerves have been torn or ruptured, recovery will take longer. Nerves located outside the spinal cord (peripheral nerves) have a special ability to repair themselves. Nerve sprouts from the cut nerve end can grow across a small gap along with nerve scar and then re-grow down the rest of the nerve at a rate of about 1mm a day or 1 inch per month. It may take many months for re-growing fibers to reach the muscles of the lower arm and hand. In some cases there is more nerve scar than nerve fibers getting across the gap and the muscle will not be very strong. If the nerve(s) has been completely unplugged from the cord, it cannot heal itself and the muscles associated with that nerve will not work. In some circumstances, ruptured or unplugged nerves in the brachial plexus can be operated on to increase the number of nerve fibers across the gap with grafts, or to connect up the unplugged nerves into places that will allow healing. Sometimes, extra nerves from outside of the brachial plexus can be added to improve muscle strength.

The second consideration is the number of nerves that have been affected. Of the five nerves of the brachial plexus, the highest two (C5, C6) are most often involved. Weakness or paralysis of the muscles served by these two nerves is called Erb's palsy. This weakness or paralysis can be seen in how a baby holds the effected arm - arm straight, with the shoulder rotated inward. If, as in some cases, all 5 of the nerves are affected by the injury, weakness or paralysis will affect the entire arm and hand. This poses more problems for recovery.

HOW DO I KNOW HOW SEVERE THE BRACHIAL PLEXUS INJURY IS?

No single test can determine the exact extent of a brachial plexus injury. On each clinic visit, the brachial plexus team will score active and stretching movements of your child's arm. This will help determine how the nerves are healing and may help to define the location and severity of the injury. If surgery is recommended, other tests may be requested.

WHAT TREATMENT IS AVAILABLE FOR CHILDREN WITH A BRACHIAL PLEXUS INJURY?

Time

The most important factor in healing of brachial plexus injuries is time. Injured nerves will often repair themselves well enough to allow close to full use of the arm. You will notice a gradual improvement in both the movement and strength in your child's arm, with most nerve and muscle recovery occurring in the first year of life. Further recovery may happen in the second year, but the effects of increased muscle strength may be much more subtle and difficult to see. Often there is some long term difference between the two arms even when the recovery is considered excellent.

Physiotherapy

Physiotherapy should be started early in the newborn who has a brachial plexus injury. Therapy will not help the nerves themselves heal any faster but it can help prevent problems such as joint stiffness and delays in development. The therapist will instruct parents in the proper handling of the baby and about the safest and most comfortable sleeping positions. Parents will also be taught exercises to help keep the baby's joints and muscles supple and strengthen muscles that are beginning to work.

Surgery

In some patients, surgery may be recommended if particular arm movements have not recovered within a length of time we know will make full recovery difficult. Children with brachial plexus injuries are carefully monitored during the first year of life to record changes in muscle strength. If the muscle does not strengthen beyond a certain point by a certain age, and the child's ability to move and use the arm is limited, then the surgeon may suggest an operation. Surgery done directly on the nerves of the brachial plexus is usually done between 3 and 9 months of age depending on the severity. In some patients, where there is a strong imbalance of muscles around the joints, we use injections of Botox (see additional handouts for more information) into the stronger muscles and use positioning devices such as a cast or splint to support the arm, allowing time for the weaker muscles to catch up.

Older children who continue to have major movement problems that limit the use of their arm may benefit from other surgical procedures on the muscles and tendons in the affected arm. Examples include tendon transfers, rotation of bone alignment and muscle transplants.

Occupational Therapy

Occupational therapists support the team in helping your child to maintain the range of motion of the arm joints as the nerves recover. This may include specific positioning devices, such as splints or wraps, to help maintain muscles in their lengthened positions. In older children, occupational therapists evaluate and treat children to help them feed, dress and take care of themselves, and participate in school and leisure activities to the best of their abilities. The occupational therapist is able to guide the surgeon by defining problems in the use of the arm when surgery is being considered in the older child.

WHAT USE WILL MY CHILD HAVE OF THE AFFECTED ARM?

During the early months of life, it is hard to predict how your child's arm will heal. Quick return of muscle function is a good sign. Most nerve and muscle recovery will occur during the first year of life with some less noticeable improvements possible during the second year. Most children regain good use of their affected arm and are able to do any of the activities that they want to, however, some muscle weakness and asymmetry of the arm and shoulder usually remains.

WHAT IS THE BRACHIAL PLEXUS CLINIC?

The Brachial Plexus Clinic at BC Children's Hospital is a multi-disciplinary clinic designed to assess and treat children as they recover from a brachial plexus injury. Typically children are seen in the clinic regularly at one to three month intervals and gradually less frequently as they go beyond one year of age. For children whose recovery is slow, more frequent monitoring may be recommended.

Your child's progress is monitored and carefully documented in order to decide on the best forms of treatment. Physiotherapy, splinting, and surgery are recommended as needed. Children continue to be monitored in the clinic throughout their childhood to measure the effects of growth and development on their functional abilities.

SUMMARY POINTS

- The brachial plexus is a group of five nerves that provide messages to and from the arm for feeling and muscle movements.
- The brachial plexus of a baby may be injured during a difficult childbirth.
- Nerves have some ability to heal and repair on their own. This is a gradual process that may take a year or longer to see how well they have healed
- In some cases, surgery of the nerves is required to improve the arm use. This is done in the first year of life.
- Parents can support improvements in their child's arm use by doing recommended positioning, exercises, and developmental play activities with their child to help maintain arm joint motion while the nerves are recovering.
- Most children make enough progress to achieve good, functional use of their arm although there is almost always some unevenness of strength and/or joint range of motion.
- The Brachial Plexus Clinic at BC Children's Hospital provides multi-disciplinary care and follow-up for children with brachial plexus injuries from birth to sixteen years of age.