Brachial Plexus Injury

Understanding pathology and rehabilitation

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Brachial Plexus Injury

Birth brachial plexus injury occurs in between 1 and 2 per 1,000 live births;

The most widely described mechanism of action for this is lateral stretch, shoulder dystocia (Shoulder dystocia is a specific case of obstructed labour whereby after the delivery of the head, the anterior shoulder of the infant cannot pass below, or requires significant manipulation to pass below) positioning of the mother and infant.

It has been described that between 50% and 95% of these infants will recover spontaneously.

The goal of treatment of brachial plexus injuries is maximizing arm and hand function.

Goals *are*

1. normalization of limb function, with optimization of nerve regeneration

2. mechanical increase of elbow flexion and shoulder stabilization.

This can be achieved through aggressive rehabilitation and microsurgical intervention.

For any nerve that is injured, classification makes evaluation and comparison clearer. The Seddon Classification of Nerve Injury is commonly used.

In axonotmesis, there is an interruption of neural continuity to some degree. There is an extremely variable level of deficit that is difficult to evaluate and predict the degree of recovery.

Neurotmesis is the most severe injury, with total disruption of the elements of the nerve, and this will not recover. If it is preganglionic, or proximal to the dorsal root ganglion, it is called an avulsion. If it is postganglionic, or distal to the dorsal root ganglion, it is called a rupture.

Both of these require surgical intervention;

There are also descriptors for the levels of brachial plexus palsy.

Injury at C5–C6 is called Erb's palsy, sometimes called Erb-Duchenne palsy.

This is the most common level of involvement,

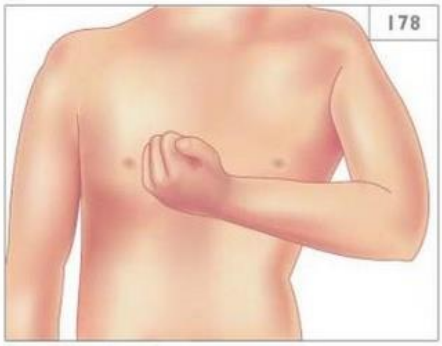
Present in approximately 3/4 of those with birth brachial plexus palsy.

Involvement of C8–T1 is Klumpke's palsy.

Therefore, if a child presents with a C8–T1 birth brachial plexus injury,

It may be from anatomical anomaly for example, a rib, tendon, bony, or other anomaly that leads to C8–T1 compromise.

177 Erb's palsy.



178 Klumpke palsy.

Assessment

Evaluation of patients with brachial plexus palsy includes **clinical findings, electrodiagnosis, and MRI**. There is debate about which of these is most effective.

- MRI is expensive and requires sedation to perform on infants. MRI was effective only in those with C5, C6 root involvement.

It has been found to correlate with surgical findings 70% of the time, electromyography 87% of the time, and clinical findings 60% of the time.

The correlation was highest when all three of these were combined.

- **Clinical exam consists of a history and physical examination.**

The history includes:

1. **birth number** of the child,
2. the birth **weight, and presence of maternal diabetes** during the pregnancy,

3. the **size of previous infants and the birth size of the parents**,
4. **motor and sensory findings** at birth, along with any change up to the time of evaluation,
5. the use of **vacuum or forceps** may be indicative of any difficulty with delivery;

- **Physical examination begins with visualization of the arm:**

A cool temperature and blue color are sometimes noted.

Sensory evaluation is critical to determine areas of involvement.

Muscle stretch reflexes will be decreased or absent in the distribution of a brachial plexus injury.

The Moro reflex, which shows shoulder abduction and elbow flexion, is valuable in assessing those active movements.

Torticollis is frequently seen, and usually this is with the face turned away from the involved arm

- **Range of motion is an important part of the evaluation since contractures are commonly seen in**

1. **shoulder** adduction and internal rotation,

2. **elbow** into flexion commonly in later months and years;

3. **wrist** flexion, forearm pronation,

Sensory nerve conduction studies, motor nerve conduction studies, and electromyography are performed.

- **Intervention and Treatment**

Education is initiated when a family is first seen. Therapy should be started as soon as possible after diagnosis.

Positioning instruction begins immediately.

Range-of-motion exercises are generally initiated after two weeks.

Pain with changing position of the shoulder for bathing or dressing in the first two weeks, so it appears that there is some tenderness after the initial brachial plexus injury, which is quickly resolved.

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To position the arm so that the baby will have maximal awareness of it.

One way to accomplish this is with the use of a wrist rattle on the **affected arm so that the baby's attention** can be drawn to that arm by sound or vision.

To have the family **replicate movements with the affected arm that the baby spontaneously does with the unaffected arm, such as bringing the hand to the mouth.**

It is important that the family realize that they need to perform the exercise program several times a day.

It is important to monitor for secondary complications.

These commonly include:

1. Muscle **atrophy and joint contractures**.

2. The affected arm frequently is **shorter and has decreased circumference** as well

3. There may **be torticollis**, most commonly with the face turning away from the involved arm.

4. Similarly, **body image** may be affected.

Prognostic

Those **with recovery by 3 months** have normal function.

Those who **had microsurgery at 6 months did better** than those who spontaneously recovered elbow flexion at 5 months;

Pathologenesis

Infraclavicular brachial plexus injuries are more commonly associated with fractures and dislocations about the shoulder or humerus, occurring more often in older adults.

Infraclavicular injuries are less severe and have better outcomes. Infraclavicular plexus injuries may also be due to falls, motor vehicle collision, or tumors (52).

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