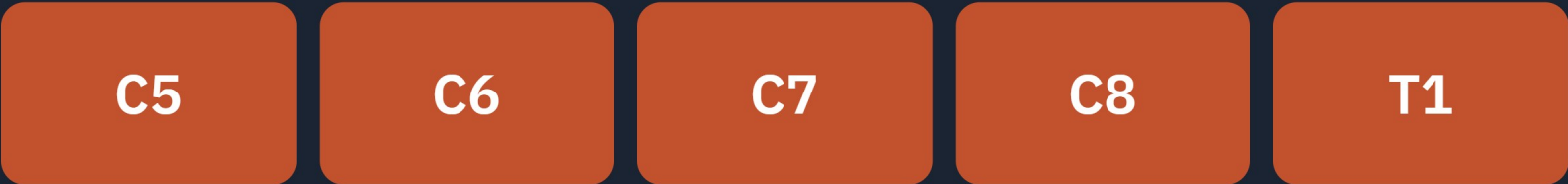


PAEDIATRIC ORTHOPAEDICS · CLINICAL NOTES

Evaluating the brachial plexus *birth injury*

Obstetric brachial plexus palsy (OBPP): what to examine, when to examine it, and which tools to score it with.



The five roots of the brachial plexus, C5 to T1

STEP 1 • HISTORY

Know who is at risk

Take a full perinatal history. The injury is a traction injury to the plexus during delivery.

- **Shoulder dystocia**

The strongest and most consistent association.

- **Fetal macrosomia**

High birth weight increases the chance of a difficult delivery.

- **Maternal diabetes**

Linked to macrosomia and shoulder dystocia.

- **Assisted vaginal delivery**

Forceps or vacuum, often with a prolonged second stage.

- **Breech delivery**

Tends to injure upper roots; can be bilateral.

Many affected babies have **no identifiable risk factor**, so examine every floppy arm.

STEP 2 • EXAMINATION

First look at the newborn

CLASSIC UPPER-ROOT POSTURE: "WAITER'S TIP"

Shoulder adducted and internally rotated • elbow extended • forearm pronated • wrist and fingers flexed

Moro reflex

Asymmetric or absent on the affected side.

Grasp reflex

Absent grasp points to lower-root (C8–T1) involvement.

Horner's sign

Ptosis, miosis, anhidrosis.
Suggests T1 avulsion and a poorer outlook.

Breathing

Tachypnoea or an elevated hemidiaphragm: think phrenic nerve (C3–C5).

Palpate the clavicle and humerus along their length for tenderness, crepitus or a step.

STEP 3 • DIFFERENTIAL

A limp arm is not always a nerve injury

Pain can stop a baby moving a normally innervated arm. Exclude these before labelling it OBPP:

01 Clavicle fracture

The most common birth fracture. Check for crepitus and a palpable callus later.

02 Proximal humerus fracture or physeal separation

May look like a dislocation; ultrasound helps where X-ray is unclear.

03 Septic arthritis or osteomyelitis

Consider if the baby is febrile, irritable, or loses movement after birth.

04 Cervical cord injury

Suspect if both arms or the legs are involved.

Remember: a fracture and a plexus injury can coexist. Reassess once the fracture has settled.

STEP 4 · CLASSIFY

Map the roots: Narakas groups

Classify by which roots are involved, based on the pattern of weakness in the first weeks.

I	Upper (Erb's) Shoulder and elbow flexion weak.	C5	C6	C7	C8	T1
II	Extended upper Adds weak wrist and finger extension.	C5	C6	C7	C8	T1
III	Total, no Horner's Flail arm.	C5	C6	C7	C8	T1
IV	Total with Horner's Flail arm and Horner's sign.	C5	C6	C7	C8	T1

Chance of full spontaneous recovery falls from Group I to Group IV. Isolated lower-root (Klumpke) palsy is rare.

STEP 5 · MEASURE

Score it, don't guess

Active Movement Scale

15 upper-limb movements, each graded 0–7. Grades 0–4 with gravity eliminated, 5–7 against gravity. Works in infants.

Toronto Test Score

Elbow flexion and extension, wrist, finger and thumb extension, each converted to 0–2. A total below 3.5 at 3 months favours surgery.

Cookie test

Around 9 months: can the baby bring a biscuit to the mouth with the arm held at the side? Failure suggests surgical referral.

Mallet classification

Older, cooperative children. Abduction, external rotation, hand to neck, hand to back, hand to mouth; each graded I–V.

Use the same scale at every visit so the trend, not a single snapshot, drives decisions.

STEP 6 • FOLLOW UP

Serial exams beat one exam

● Birth – week 1

Full exam, exclude fracture, record baseline. Start gentle passive range-of-motion.

● 1 month

Repeat scoring. Not fully recovered? Refer to a brachial plexus team.

● 3 months

Key decision point: antigravity biceps and Toronto score. Horner's or flail arm: plan early surgery.

● 6 months

Reassess. Imaging if nerve surgery is being considered.

● 9 months

Cookie test for persisting elbow flexion deficit.

● Through growth

Monitor shoulder external rotation for secondary deformity.

STEP 7 • INVESTIGATE

Imaging, tests and the shoulder

- **X-ray**

Clavicle and humerus for fractures; chest film for a raised hemidiaphragm.

- **Ultrasound**

Diaphragm movement, shoulder congruity and glenoid shape, without radiation.

- **MRI or CT myelography**

Pseudomeningoceles suggest root avulsion. Mainly for surgical planning.

- **EMG / nerve conduction**

Can overestimate recovery in infants; interpret alongside the clinical exam.

WATCH THE SHOULDER

Losing passive external rotation with the arm at the side is an early warning of glenohumeral dysplasia or posterior subluxation. Image it promptly.

TAKEAWAY

Red flags for *early referral*

- Horner's sign
- Flail arm (total palsy)
- No antigravity biceps by 3 months
- Phrenic nerve palsy
- Loss of passive external rotation
- Not fully recovered by 1 month

Educational summary for clinicians and students; not a substitute for individual assessment. Thresholds vary between centres. References: [ADD SOURCES]