# PLEASE CLICK ON THE FOLLOWING LINK TO WATCH THE LECTURE ONLINE:-

https://www.youtube.com/watch?v=LnfKkeprrxA





### **Obstetric Brachial Plexus Palsy OBPP**

### Every thing you need to know

Eyas Al Zuqaili MD Orthopedic and Trauma Senior Specialist Pediatrics orthopedic Department

Queen Rania Hospital For Children Royal Medical Services



# Outline

- Anatomy
- Definition
- Incidence
- Risk factors
- Classification
- Clinical findings
- Approach
- Investigation and imaging
- Management
- Take home messages



# Anatomy





## Definition

• Flaccid paralysis of the <u>upper extremity muscles</u> due to traumatic <u>stretching</u> of the brachial plexus received during birth delivery.





### Incidence

# 0.38-3/1000

# 0.19-2.5/1000



## **Risk factors**





### Neonatal factors

- Large Birth Weight > 4kg
- Breach presentation
- Low APGAR score

Maternal factors

- Age > 35kg
- Cephalo pelvic disproportion
- Gestational Diabetes
- BMI
- Post date

### Labor- related

- Increased 2<sup>nd</sup> stage of labor
- Induction of labor
- Oxytocin augment
- Assisted delivery (forceps, vacuum)



## Classification







# Anatomy

Group	Туре		Inv	olved roots	Affected area	I
1	Upper		C5	to C6	Shoulder abd elbow flexion	uction/external rotation,
2	E Lower lesion	C8 and	T1	Klumpke's pa	aralysis	Hand intrinsic muscles
3	<b>1</b> F		1		I	FDS and FDP
4	Total palsy with Horne syndrome	erís	C5	to T1	Complete flac syndrome	cid paralysis with Horner

C= Cervical root, T= Thoracal root Adapted from Narakas (1987)







# **Clinical findings**



### Muscle Imbalance !!!





# **Clinical findings**

	Position	Paralyzed muscles
Shoulder	adduction	(Abductors) Deltoid, Supraspinatus
Arm	Internal rotation	(External rotators) Infraspinatous, Teres minor
Elbow	Extension	(Elbow flexors) Biceps, Brachialis and brachioradialis
Forearm	Pronation	(forearm supinator) Biceps
Wrist	Flexion	(Wrist extensor) ECRL, ECRB





# Approach

# pseudoparalysis

• Is it really Brachial Plexus Palsy ?





# Approach

- History
- Physical examination
- Decrease spontaneous movement
- Asymmetrical reflexes (Moro reflex
- Ipsilateral Horner syndrome consis
- Phrenic nerve involvement



## Investigation and imaging





## Management

### • Natural history:

- The rate of spontaneous recovery in obstetric brachial plexus palsy (OBPP) depends on the severity of the nerve injury:

### 1. Neuropraxia (Mild, Stretch Injury)

- 1. Most common type.
- 2. Spontaneous recovery: ~80-90% within the first 3–6 months.
- 3. Full recovery usually occurs without intervention.

### 2. Axonotmesis (Moderate, Partial Nerve Damage)

- 1. Recovery depends on the extent of axonal damage.
- 2. Spontaneous recovery: ~50-75% within 6–12 months.
- 3. Some children may have residual weakness.

### 3. Neurotmesis (Severe, Complete Nerve Rupture or Avulsion)

- 1. Spontaneous recovery: 0-10% (very rare).
- 2. Requires surgical intervention (nerve grafts, transfers).
- 3. Best surgical results occur when performed before 9-12 months of age.



#### SHOULDER FLEXION



Infant is lying on back. Stabilize shoulder with one hand and wrist with the other. Lift the arm up to the leve thumb leading, elbo

#### SHOULDER ABDUCTION



Infant is lying on his/her back with one hand and forearn Lift the arm sideways away bring the arm up to the level

#### SHOULDER ROTATION



Infant is lying on his/her back. with one hand and forearm w forearm down towards midlin draw forearm out to side a WRIST ABDUCTION AND ADDUCT



#### **ELBOW FLEXION AND EXTENSION**



Infant is lying on his/her back. Stabilize the elbow and hold wrist with other hand.

v, then straighten

PRONATION



ack. Stabilize upper arm ping the elbow and the other hand. and hand up, and hand down.

ION



g or sitting. one hand while with the other. en straighten.

UCTION



Infant is lying on his/her back. Stabilize forearm with one hand while holding child's hand with your other hand. Move wrist from side to side. Infant can be lying or sitting. Hold the child's wrist straight with palm open and fingers held straight. Spread the fingers apart gently, then bring them back together.

Figure 2.4. Infant Range of Motion Exercises. To be performed very gently. Each position should be held for 30 second and each motion repeated 10-15 times, only until mild resistance is felt. Exercises should be implemented into daily routine and demo strated to patient's therapist once a month.



## Management

- Conservative method:
- Passive ROM exercise and splinting waiting for spontaneous recovery
- Early recovery of elbow flexion i.e. Biceps function within the first three months is considered to be good prognostic factor for further recovery.



## Management









## Investigation and imaging

- EMG and NCS
- Cervical spine MRI





### **Conservative method**

- what's the aim ?
- Attention to shoulder ROM, especially maintenance of passive external rotation, is critical
- Loss of passive ROM = delayed recovery = Muscle Contractures
- The effect of the rapid growth of the infant ??





Glenoid Retroversion =  $(90 - \alpha)$  degrees

Humeral head translation = (AB/AC) x 100 percent

Classification	Radiographic Features
Type I	< 5 degree difference in retroversion
Type II	> 5 degree difference in retroversion
Туре III	Posterior humeral head subluxation, <35% anterior to scapular spine axis
Type IV	Presence of false glenoid
Туре V	Flattening of humeral head, progressive/ complete humeral head dislocation
Type VI	Infantile posterior dislocation
Туре VII	Proximal humeral growth arrest

Radiographic classification of glenohumeral dysplasia<sup>13</sup>. Schematic diagram depicting the technique of determining glenoid retroversion and humeral head subluxation on the basis of axial computed tomography or magnetic resonance imaging.







## **Muscle contractures**

- The clinical findings of posterior subluxation of the shoulder are similar to the findings in developmental dysplasia of the hip:
- Apparent shortening of the humeral segment,
- Deep axilla
- Limited external rotation
- Posterior fullness, at times with a palpable click indicating either reduction or snapping over the posterior labrum



	Modified Mall	et Classification	(Grade I = No Functio	on, Grade V = Normal Fu	nction)	
	Not Testable	Grade I	Grade II	Grade III	Grade IV	Grade V
Global Abduction	Not Testable	No function	<30°	30° to 90°	>90°	Normal
Global External Rotation	Not Testable	No function	<0°	0° to 20°	>20°	la Normal
Hand to neck	Not Testable	No function	and the second second	A P		Normal
			Not possible	Difficult	Easy	
Hand to spine	Not Testable	No function	(T A)	( D	A-D	Normal
			Not possible	S1	T12	
Hand to mouth	Not Testable	No function	R	R	R	Normal
			Marked trumpet sign	Partial trumpet sion	<40° of abduction	
Internal rotation	Not Testable	No function	-gr			Normal
			Cannot touch	Can touch with	Palm on belly	



## How to manage?



























Plate and screws fixing upper humeral segment

D

Compl lateral lower इ M

Post

Post op











### • <u>Elbow</u>:

- Fixed flexion deformity
- Due to Co-contracture of flexors and extensors
- Serial casting,, Botox injection,, surgical release



• Forearm

а

active sup pronation

Attention generally



and active



### • <u>Forearm</u>:

- Pronation deformity:
  - \* Botox injection
  - \* release of pronator teres
- Supination deformity:
- Z-Lengthening of the Biceps tendon
- rerouting of the Biceps tendon insertion





Z-plasty incision in biceps brachii tendon Distal segment of biceps brachii tendon rerouted from medial to lateral side

D

Biceps brachii tendon sutured at length to maintain pronation of forearm, extension of elbow



- Derotational osteotomy
- A position of neutral to slight pronation is preferable to a position in either extreme of supination or pronation



### • <u>Wrist</u>

- Wrist drop is due to C7 involvement
- ROM exercise and splinting
- Tendon transfer !! After age of 7 years



### • Hand:

- Involved in lower root injuries
- Bad prognosis of recovery
- PT and splinting
- High failure rate of surgeries
- Most of the ends with wrist arthrodesis at maturity



Orthopedic





# Take home messages

### Early Detection, Better Outcomes

- Timely diagnosis and intervention are crucial.
- Monitor Recovery Closely
- Most cases resolve spontaneously, but some require further intervention.

### Rehabilitation is the Cornerstone

- Physiotherapy and occupational therapy optimize functional recovery.

### Recognize When Surgery is Needed

- Consider surgical intervention if no significant improvement by 3–6 months, or secondary and tertiary deformity established
- Holistic, Multidisciplinary Care
- Collaboration among specialists leads to the best patient outcomes.

