

## Role of early physiotherapy to enhance functional recovery in obstetric brachial plexus palsy : A case report

Zainab Quresh<sup>1\*</sup>, Sathees Kumar<sup>2</sup>, Praveen Kumar<sup>1, 2</sup>

<sup>1</sup>Department of Physical Therapy, Gulf Medical College Hospital and Research Centre, Ajman, UAE

<sup>2</sup>College of Allied Health Sciences, Gulf Medical University, Ajman, UAE

\*Presenting Author

### ABSTRACT

**Background and Purpose:** Obstetric Brachial Plexus palsy (OBPP) is a disease with deleterious medical, psychological and socioeconomic sequelae for the patient and his or her family. Many evidences show acceptable spontaneous recovery with non-operative management, which includes aggressive physical rehabilitation and electrical stimulation in OBPP. The available health resources limit the amount of therapy that may be offered to children with OBPP and the amount of training in each session may be insufficient to enhance the functional recovery. So the purpose of this case report was to describe the use of a structured early physiotherapy to enhance functional recovery in OBPP.

**Case description:** The patient was a 2 week-old girl diagnosed with OBPP. The early physiotherapy session consisted of stretching exercise, active assisted exercise, electrical muscle stimulation and home exercise program. These interventions were given for 30 minute per day, 2 times in a week for 8 week. Pretest and post test score were obtained by Clarke movement scoring system, Gilbert's strength grading and Functional outcome scales.

**Results:** The child demonstrated significant increase upper limb strength, range of motion; and Functional outcome scales at the end of 8 week physiotherapy program.

**Conclusion:** Structured early physiotherapy is safe and effective to enhance the functional recovery in OBPP child.

**Key words:** obstetric brachial plexus palsy, physiotherapy, functional outcome

### INTRODUCTION

Erb's palsy is initially frightening. The infant's arm hangs limply from the shoulder with flexion of the wrist and fingers due to weakness of muscles innervated by cervical roots C5 and C6. Risk factors are macrosomia (large baby) and shoulder dystocia<sup>1</sup>. The experience of the delivering physician may not influence the risk of Erb's palsy (0.9 to 2.6 per 1000 live births). Differential diagnosis includes clavicular fracture, osteomyelitis and septic arthritis<sup>2</sup>. Fortunately, the rate of complete recovery is 80% to 96%, especially if improvement begins in the first two weeks<sup>1</sup>. Recommended treatment includes early immobilization followed by passive and active range of motion exercises (although there is no proof that any intervention is effective). For the few infants with no recovery by three to five months, surgical exploration of the brachial plexus may improve the

outcome<sup>3,4</sup>. One infant with Erb's palsy who illustrated various manifestations in the course of this disorder is presented.

### CASE REPORT

A two-week old girl born to gravid (G) 2 para (P) 2, 28 year old women, diagnosed with Obstetric Brachial Plexus Palsy presented to the physiotherapy department with the typical 'policeman's tip position'.

The patient was delivered through a vaginal delivery that was assisted with low forceps but shoulder dystocia led to a difficult extraction. After two days of delivery, the child's right arm was noticed to be limping and was neglected. A small program of passive exercise was performed for the child, and by the end of the week she was referred to the physiotherapy department.

There was no history of pain, contusion or skeletal deformity suspecting a clavicle fracture. An X-ray confirmed the same.

On Examination, the right shoulder was in internal rotation, adduction, right elbow extended, right wrist flexed and ulnar deviated. The shoulder girdle as a whole was elevated. There was no obvious muscle atrophy and no visible congenital deformity. On Sensory Examination, Tactile sensation is normal.

On Motor Examination;

**R.O.M.:**

1. Right Shoulder – Active Flexion: 90 degrees ;Passive Flexion : 160 degrees
2. Right Elbow – Active Flexion: 0 degrees ; Passive Flexion : 130 degrees
3. Right wrist – Active Extension: 0 degrees ; Passive Extension : 80 degrees

**POWER:**

1. Right Shoulder: Flexion against gravity Abduction within gravity
2. Right Elbow: Flexion – No hand to mouth activity can be done
3. Right Wrist: Extension – Cannot be done with finger flexion

**Clinical Features and Treatment Strategy**

Obstetrical brachial plexus palsy occurs at a frequency of 0.38 to 1.56 per 1000 deliveries and has not become any less common despite full awareness of the problem and improved obstetrical techniques. The risk factors are shoulder dystocia, macrosomia (birth weight over 4 kg), fetal-maternal disproportion with an arrow birth canal and/or maternal overweight (particularly in diabetes mellitus or gestational diabetes), and breech delivery.

Obstetrical brachial plexus palsies are divided into two major types according to the distribution and severity of the injury: upper brachial plexus palsy (“Erb’spalsy”), involving the C5 and C6 nerve roots and sometimes C7 as well, and complete brachial plexus palsy, involving all of the nerve roots from C5 to T1. Depending on the distractive force between the head and the shoulder, the

plexus injury may consist solely of nerve stretching (neurapraxia), which resolves without any further deficit within three weeks, or of more severe forms ranging all the way to nerve root avulsion or proximal nerve tears, which have no potential for spontaneous recovery. The severity of the injury and the extent of paralysis are prognostically assessed in the first three to nine months of life. In upper brachial palsy (C5 and C6 nerve roots: shoulder muscles and forearm flexors), the shoulder is held in an adducted, internally rotated position, while the lower arm is extended and hand function remains normal. If the C7 nerve root is also involved, there is additional weakness of the triceps and wrist extensors or muscles. In complete brachial plexus palsy, the motor and sensory function of the hand is also affected.

In the first ten days postpartum, mechanical stress is taken off the injured area of the neck by positioning the arm next to the upper body with the elbow flexed. Afterward, physiotherapy is begun, in order to support regenerative processes.

If the recovery is not yet complete by the time the infant is two months old, surgical consultation is obtained.

In cases of severe injury with nerve root avulsion and/or complete brachial plexus palsy with hand involvement, surgery is performed at the age of three months. Partial upper brachial plexus palsies can be observed for further recovery for a variable period of time (till the infant is three to nine months old); inadequate regeneration of the proximal musculature (shoulder and/or biceps) signifies that microsurgical reconstruction is indicated.

**INTERVENTION OUTCOME**

**Active movement scale<sup>5</sup>**

The AMS was designed to evaluate the active range of motion (AROM) of patients with brachial plexus palsy. It evaluates 15 joint movements from the shoulder to hand on an 8-point scale (0 meaning no muscle tone or contraction when gravity eliminated, 7 meaning full range against gravity). The reliability of the AMS has

been documented in infants. AMS can be used to grade upper extremity movements according to the performance done against gravity or not. It does not require the child to perform tasks on command and can be used in infants and young children.

Table 1. Active Movement Scale

Active Movement Scale		Grading
Gravity eliminated	No contraction	0
	Contraction, no motion	1
	Motion, <50% range	2
	Motion, >50% range	3
Antigravity	Full motion	4
	Motion, <50% range	5
	Motion, >50% range	6
	Full motion	7

\*Each of the following upper extremity motor functions is tested and assigned a score of 0-7: shoulder flexion, shoulder abduction, shoulder internal rotation, shoulder external rotation, elbow flexion, elbow extension, forearm supination and wrist extension.

**FUNCTIONAL ASSESSMENT SCALE**  
**Modified Mallet classification of shoulder function<sup>6</sup>**

Patient was facilitated to perform active

2 shoulder movements – abduction and placing the hand to mouth. Each shoulder movement is subsequently graded on a scale of I (no movement) to V (normal movement symmetric to contralateral, unaffected side).

**RESULTS**

Table 4. Effectiveness of early physiotherapy in modified Mallet classification of shoulder function and Raimondi score for hand function

Variables	Pre test	Post test	Mean improvement
Modified Mallet classification of shoulder function	1	4	3
• Global abduction			
• Hand to mouth	1	2	1
Raimondi score for hand function	1	2	1

**DISCUSSION**

This case study was aimed to find out the effectiveness of early physical therapy on Erb’s palsy child. The child underwent 2 month early physiotherapy, including

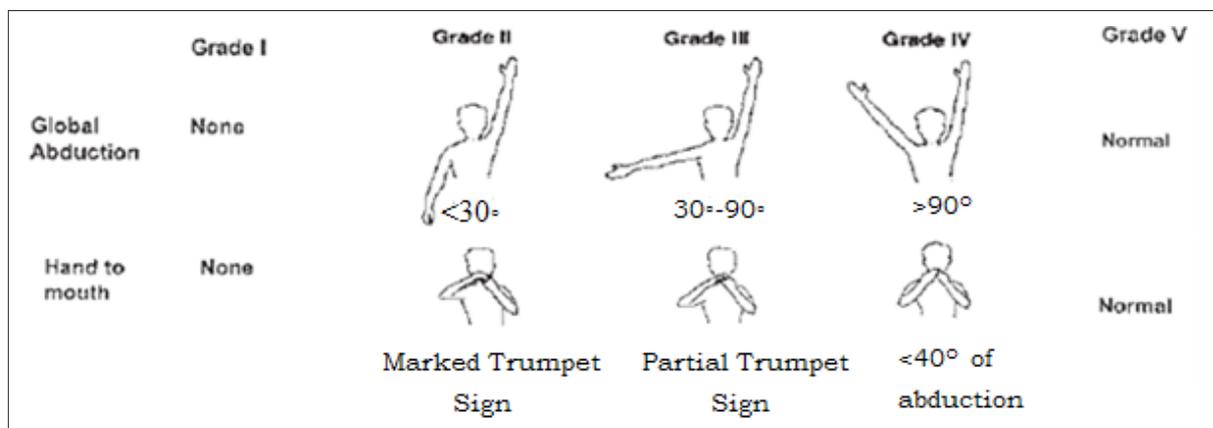


Figure 1. Modified Mallet classification of shoulder function scale

Table 2. The Raimondi score for hand function<sup>7</sup>

The Raimondi score for hand function	Grading
Complete paralysis or functionally useless finger flexion, Non-usable thumb without grasping function & Little or no sensation	0
Limited finger flexion, No finger or wrist extension & Key grip possible	1
Active wrist extension and use of the tenodesis effect & Passive key grip in pronation	2
Complete active finger and wrist flexion, Active thumb movement, including abduction and opposition, Intrinsic equilibrium & No active supination	3
Complete active finger and wrist flexion, Active wrist extension, but weak finger extension (or none), Good opposition of the thumb with active ulnar intrinsic muscles & Beginning pronation and supination	4
like 4 with active finger extension and nearly complete pronation and supination	5

Table 3. Effectiveness of early physiotherapy in Active Movement Scale

Variables	Pre test	Post test	Mean improvement
Shoulder flexion	1	4	3
Shoulder abduction	2	4	2
Shoulder external rotation	1	3	2
Elbow flexion	0	2	2
Elbow extension	6	7	1
Forearm supination	1	2	1
Wrist extension	2	6	4

stretching, movement facilitation and positioning care. The outcomes were measured by using Clarke movement grading, Gilbert's strength grading and modified Mallet classification of shoulder function.

After 8 week of early physiotherapy, the shoulder abduction and wrist extension range of motion improved from 4 to 6 and 3 to 5 respectively in Clarke movement grading. These details are mentioned in Table-2. These result stated that the early physiotherapy is effective to improve the shoulder and wrist range of motion. These results were supported by Marcus J R, et al<sup>3</sup>, who state that early physical therapy may help the children to improve the shoulder and wrist function effectively.

Also, the Modified Mallet score taken at pre and post treatment showed mild to moderate improvement in shoulder

function. The Raimondi score for Hand Function showed mild improvement in hand function.

### CONCLUSION

With more case studies and appropriate recordings of assessment score after treatment, this study can be further used to confirm the advantage of early physiotherapy in patients with OBPP.

### REFERENCES

1. Gilbert A, Pivato G, Kheiralla T. Long-term results of primary repair of brachial plexus lesions in children. *Microsurg* 2006;26:334-42.
2. Chater M, Camfield P. Erb's palsy - Who is to blame and what will happen? *Paediatr Child Health* 2004 October;9(8):556-560.
3. Marcus JR, Clarke HM. Management of obstetrical brachial plexus palsy—evaluation, prognosis, and primary surgical treatment. *Clin Plast Surg* 2003;30:289-306.

4. Chuang DCC, Mardini S, Ma HS: Surgical strategy for infant obstetrical brachial plexus palsy: Experiences at Chang Gung Memorial Hospital. *Plast Reconstr Surg* 2005;116:132-42.
5. Curtis C, Stephens D, Clarke HM, et al. The active movement scale: an evaluative tool for infants with obstetrical brachial plexus palsy. *J Hand Surg* 2002;27:470-478.
6. Mallet J. Paralyse obstetricale du plexus brachial. Traitement des se´quelles. Primaute du traitement de l'e´paule—me´thode d'expression des re´sultats. *Rev Chir Orthop Reparatrice Appar Mot* 1972;58:166-168.
7. Raimondi P. Evaluation of results in obstetric brachial plexus palsy: the hand. Presented at the International Meeting on Obstetric Brachial Plexus Palsy. Heerlen, The Netherlands: 1993.