

Effect of Constraint-Induced Therapy along with Play Therapy for Radial Dysplasia with Pollicisation: A Case Study

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ABSTRACT

Radial dysplasia is a congenital deficiency resulting in a short & bowed forearm, radial deviation of the wrist, a non-functional or absent thumb and shortening of the forearm. A 19-months old male child with right side grade 5 radial dysplasia, presented with abnormal posture with neglect of right hand, which was limiting his participation in functional play. A single case study was carried out to assess the effect of Occupational Therapy intervention, post index pro thumb pollicisation. Erhardt Developmental Prehension Assessment (EDPA) scale was used as an outcome measure to assess developmental sequence clusters. Child undergone constraint-induced therapy along with play therapy sessions for 8 months thrice a week. EDPA score for right side, improved 3 months to 10 months, obtained optimal gestuality and functional play activities. Thus, constraint-induced therapy along with play therapy was effective in radial dysplasia with pollicisation.

Keywords: Constraint Therapy, Functional recovery, Play therapy, Pollicisation, Radial dysplasia

❖ INTRODUCTION

Radial dysplasia is a congenital deficiency along the pre-axial or radial side of the extremity. It occurs 1 in 100000 live birth, more common in males than females. Ranges from 4.7% to 6.1 % of all congenital anomalies. Bilateral in 38% to 50% cases. When unilateral twice as frequent in right side. The more pronounced anomalies are characterized by a short and radially bowed forearm, radial deviation of the wrist, stiff fingers and a sub-functional or absent thumb. In these individuals, not only the skeletal structures are anomalous, but also muscles, tendons, vessels and nerves on the radial side of the forearm and hand.¹ It had impaired child's upper extremity motor skills necessary for object exploration and play and engage in his environment. Constraint-induced therapy is an intervention in which a constraint is utilized

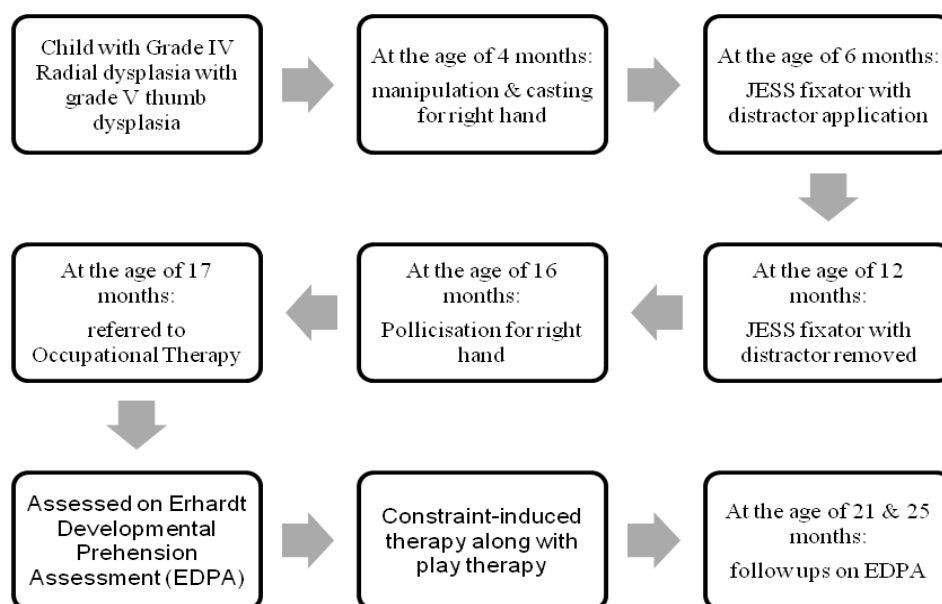
on the unaffected hand of a child to improve functioning of their involved upper extremity.

It involves intensive training of the weaker arm while restricting the use of the stronger arm. It has been studied in the paediatric populations which have had promising results.² Play allows children to use their creativity while developing their imagination, dexterity & physical, cognitive & emotional strength. Play is important to healthy brain development. It is through play, that children at a very early age engage & interact in the world around them. Play therapy was designed for active involvement of child in performing various tasks.³ EDPA is an observational tool for functional assessment of hand functions in the children with developmental disabilities. Thus, it aimed to study the effect of constraint-induced therapy along with play

therapy in radial dysplasia with pollicisation.

❖ CASE PRESENTATION

Illustration 1: Timeline of case report-



As per illustration 1, child undergone Occupational Therapy intervention for 8 months, after that child did not follow up for therapy.

Clinical findings- absence of right thumb, right sided wrist radial deviation, faulty posture in form of right shoulder elevation, neglect of right hand, which was affecting functional play.

Assessment- Erhardt Developmental Prehension Assessment (EDPA) was used for assessment & outcome measure. EDPA is an observational style hand function assessment in which the therapist observes the child in a certain position or the child is presented with the stimulus & their reaction

is observed & recorded. This can be used in the children with developmental disabilities. It takes 30-60 minutes to complete the assessment. It consists of three parts: formal test, translating scores into developmental level to score sheet & overview of the child's function. The formal test divided into three sections; Primarily involuntary arm-hand pattern, Primarily voluntary movements & Pre-writing skills.⁴

Intervention- Occupational Therapy sessions were conducted for 8 months thrice a week to improve range of motion, muscle power, hand function & unilateral as well as bimanual hand use of the right upper limb. (Table 1).

Table 1: Intervention^{5,6}-

Timeline	Components	Therapeutic activities
0 - 2.5 month	To improve proprioceptive input	Crawling, wall pushing, passing through tunnel, rock on hands & knees, reaching for toys in quadruped position (Figure 1A)
	To improve ROM	Cards turning, popping bubbles, holding rattles & different shapes of balls, transferring objects from one box to another
2.5 - 5 months	To improve muscle power	0-2.5 months intervention to be continued Water squeeze, theraputty, clay activities, carrying a toy bag, using hole punch
	To improve hand function	Building a tower with blocks, eating pieces of fruits, water sprayer, tug of war
5 - 8 months	To improve unilateral hand use	0- 5 months intervention to be continued Throwing ball, stacking rings, sensory bin, shaving foam activities, holding a glass, eating with spoon, opening/closing water bottle, scribbling/coloring on vertical surface
	To improve bimanual hand use	Play activities (climbing ladder, trapeze, swing), bathing, combing, playing with rolling pin, clean up his toys, throwing & catching ball (Figure 1B)



Figure 1 (A & B):

❖ RESULT

Table 2 shows Pre & Post score of EDPA

Table 2: Pre & Post EDPA Score-

EDPA For right side	Baseline	After 4 months of intervention	After 8 months of intervention
Primarily involuntary Arm-Hand pattern	3 months	8 months	10 months
Primarily voluntary movements	3 months	7 months	10 months
Pre-writing skills	< 1 year	1 year	1.6 years

❖ DISCUSSION

Pollicisation substitutes a functioning finger for a deficient thumb which is important for manipulation of objects in the physical world, not only from a functional but from a mental and emotional standpoint.⁷ In this study, we observed child's improvement in involuntary arm-hand pattern and voluntary pattern, from 3 months to 10 months, on EDPA. This could be due to cortical plasticity & motor relearning play a pivotal role in function, following pollicisation. This is supported by Kozin (2012) concluded Occupational Therapy encouraged large object acquisition followed by smaller objects and ultimately fine pinch, by emphasizing thumb usage.⁸ Also, an improvement was observed in voluntary pattern, as constraint-induced therapy must have improved child's arm motor ability and the functional use of a affected arm-hand.⁹ Johnston (2001) observed that children with asymmetrical upper extremity motor control benefited from constraint therapy.

Play is important in motivating and positively reinforcing children (Couch et al.,1998).

In our study, child showed improvement in pre-writing skills from <1 year to 1.6 year, on EDPA. As child received Occupational Therapy intervention,

to improve upper extremity strength, hand function, bimanual hand use which are the prerequisites for writing readiness.¹⁰ Miller (2009) found play as a modality for improving gross & fine motor skills, visual-motor skills that indicated greater participation and intrinsic motivation with play activities in children.⁶ Addition to that, Milton (2016) observed that play along with constraint therapy was effective in improving functional use of affected hand, led to exploration to senses & motor integration.² Long term follow up & training would be necessary to maximize functional outcome & active participation of child.

❖ CONCLUSION

The constraint-induced therapy along with play therapy improves participation of the children in functional play.

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