First Edition

Management of Children with Deafblindness with Cerebral Palsy Part - II

Developing Fine Motor Skills

sense International (India)

Working with deafblind people throughout India

Resource and Information Unit

Acknowledgement

Over the years of working with deafblind children and adults, Sense International (India) has witnessed enrolment of many children with Sensory Impairments having associated condition of Cerebral Palsy in the projects. Management of children with associated Cerebral Palsy along with deafblindness is often perceived as a challenging task by majority of the special educators and parents. This created the need to edify and update the skills about management of these children. This booklet gives step by step instruction of management of problems and developing fine motor skills and play skills of children with Cerebral Palsy and deafblindness. The pictorial illustrations will help teachers to provide basic need based support to children having associated condition of Cerebral Palsy.

We thank all deafblind children, their educators and parents for putting forth the need for this information material. The contents in this booklet is informative and also looks attractive because of the illustrations. These are done by Mrs. Viji Dayan and we thank her for the same. We also thank Ms. Anupama Naomi Joseph for designing the cover page of this booklet

The credit of this booklet goes to the untiring efforts put in by Ms. Anna Daniel to work on and finalise the contents. We would also like to thank Ms. Sampada Shevde, Mr. Uttam Kumar, Ms. Brahada Shanker and Mr. Sachin Rizal for their constant support. They have reviewed the chapters by editing, adding, and compiling with never ending enthusiasm. We also appreciate the efforts of Mr. Shivkumar Sharma in designing the art lay out of the booklet.

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Preface

Children with deafblindness experience a range of associated conditions like Cerebral Palsy, Mental Retardation, Autism, Epilepsy, etc. Deafblind children with associated condition of Cerebral Palsy become the subject to orthopaedic and other functional complications, such as limitations of movement, scoliosis, joint instability, bowel and bladder dysfunction, dysarthria and dysphagia, and altered growth and nutrition. The physical and psychological consequences of compromised mobility and independence, difficulties with communication, altered appearance, and chronic illness may also require identification and specific intervention.

Cerebral Palsy along with deafblindness creates more difficulties in the life of individuals by limiting their ability to learn, explore and express themselves in their immediate environment. Thus, it is very important to identify these associated conditions, correct them and facilitate the maximum improvement in a child.

Children with deafblindness and Cerebral palsy may also have problems with visual concentration and/or eye-hand skills. Many of the children expend so much energy and concentration on keeping their body upright, controlling an accurate reach, etc. they have little left over to use for visual tasks. These children will benefit from additional sensory input and encouragement to right their reach or their heads in different positions in order to develop head control and more mature righting and equilibrium responses.

For most of the deafblind children communication modes requires the use of motor movements like using sign language, pointing to objects or giving objects. But these children with concurrent Cerebral Palsy may face lots of difficulties to communicate through tactile sign language or the above techniques, because of poor hand functions, making communicating with them more difficult.

This booklet gives activities to develop fine motor skills and play. Since each child is different, the reader will have to modify the activities given to facilitate movement based on individual child needs and skills even though the techniques remain the same.

Contents

CEREBRAL PALSY

Cerebral Palsy refers to a disorder of movement or posture due to an insult to the developing brain. Cerebral Palsy or C.P. is a condition that is mainly characterized by an inability to fully control motor function. This may include muscle tightness or spasm, involuntary movement, and/or disturbance in gait and mobility.

WHAT ARE MOTOR SKILLS?

A motor skill is an action that involves the movement of muscles in your body. It is done with the intent to perform a specific act. Thus, running, jumping, writing, stringing beads are all motor skills.

WHAT ARE FINE MOTOR SKILLS?

Fine motor control generally refers to control over the small movements of the hands and fingers, as well as the small muscles of the face and mouth (tongue) and feet. However, the focus is usually on developing the skills of the small muscles in the hands.

Some examples of fine motor skills include picking things up between the thumb and finger, colouring, writing, stacking objects, signing etc.

Fine motor skills often involve the hands and eyes, but not necessarily. For example, visually impaired people are able to develop fine motor skills without the use of their eyes.

Gross motor (larger movements involving the arm, leg or feet muscles or the entire body like sitting, crawling, walking etc.) and fine motor skills develop in tandem because many activities depend on the co-ordination of both skills. At 3 months you may notice your baby bringing his/her hands together over his/her chest as he/she lies on his/her back (a gross motor skill) and then playing with his/her hands (a fine motor skill). Even filling a shape sorter box, at about 18 months, for example, requires both

gross and fine motor skills. Your baby has to be able to hold his/her body steady enough to grasp the shapes firmly and then to twist or turn each shape so that it fits into its appropriate hole.

Four Essential Prerequisites for Fine Motor Development

As described above, fine motor development does not happen in isolation from other skills. As with all areas of child development, a lag or delay in one area can impact on other areas of development. In order for fine motor skills to develop, there are **Four Essential prerequisites** that need to be in place.

Think of your child's fine motor development as a 4-legged stool. Each leg of the stool represents one of the prerequisites for fine motor skills. When one of those legs is missing, or misshapen, the stool will wobble and topple over. Each of the legs has to be in place in order for the stool to be stable.

1) ***Postural Control -*** A child should be well positioned and should have good control of his head, trunk and shoulders to perform a fine motor skills. For example, if the child is not able to hold his head and trunk steady. It takes huge amounts of effort to control his body and then perform a task, say writing. The results are usually satisfactory. So, in order to control the small muscles in the hand, the bigger muscles of the trunk and shoulders need to hold steady.

2) ***Tactile Perception (also known as touch perception) -*** If you are not getting good feedback from your fingers, it is hard to be accurate with them. Suppose you are blindfolded and is asked to sort rice and chana. You can easily sort it by touching and feeling the differences between both. But it is difficult to sort rice and chana when you are wearing a woolen mitten because you are not able to touch and feel the differences.

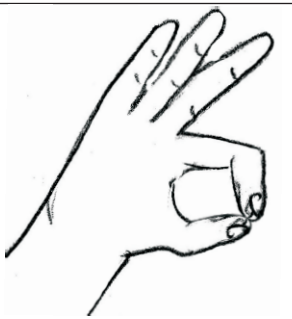
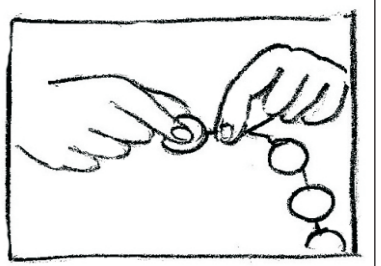
3) ***Bilateral Coordination -*** This is the ability to use the two sides of the body together in a coordinated way. It may seem like a strange pre-requisite when we are talking about fine motor skills, but if your hands don't work well together,

simple tasks like tying your shoelaces, cutting with scissors, and tightening a bolt will be tricky for you.

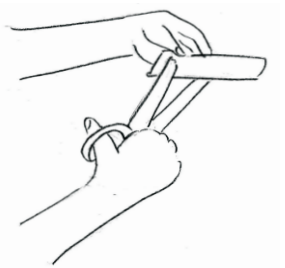
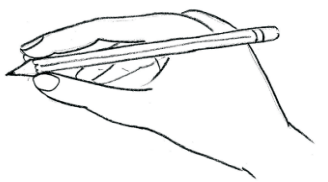
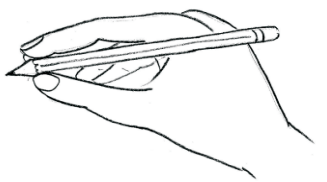
4) ***Hand Functions*** **-** This is the fourth pre-requisite for fine motor skills, because the muscles of the hand need to learn to work well together to control pencils and other small objects. Closely related to that are wrist and forearm position, as the wrist and forearm get the hand into place for writing.

In children with deafblindness and Cerebral Palsy, problems can be seen in some or all of the above pre-requisites and we need to address these issues while developing hand skills.

Normal fine motor development

Age	2 months	4 months	7 months	8 months
Fine Motor Skills	Hands predominantly closed	Reaches for objects inaccurately	Can pick up and hold a small cube	Transfers objects from one hand to another
	 *Fig. 1:Hands closed*	 *Fig. 2:Reaching for objects inaccurately*	 *Fig. 3:Holds a cube*	 *Fig. 4:Transfers object from one hand to the other*
Age	**10 months**	**12 months**	**18 months**	**2 years**
Fine Motor Skills	Picks up a 1” bead with thumb and index finger,	Picks up tiny objects with the tip of thumb and index finger	Holds crayon with whole hand, thumbs up	Strings big beads, scribbles spontaneously, makes a ball with clay
	 *Fig. 5: Pincer grasp*	 *Fig. 6:Tip to tip pinch*	 *Fig. 7:Palmar supinate pencil grasp*	 *Fig.8: Stringing beads*

Normal fine motor development

Age	2.5 years	3 years	4 years	6 years
Fine Motor Skills	Holds pencil with thumb and all fingers, forearm turned, can draw a vertical line	Imitates simple shapes with clay. Snips with scissors. Cam imitate drawing a circle	Can hold a pencil using 3 fingers, but moves the entire arm, forearm and wrist to draw and write, cuts straight line with scissors	Grasps a pencil with 3 fingers and writes with movements of fingers and minimal movement of wrist
	 *Fig. 9:Digital pronate pencil grasp*	 *Fig. 10:Snips with scissors*	 *Fig. 11:Static tripod pencil grasp*	 *Fig. 12.Dynamic tripod*

DIFFERENT HAND FUNCTIONS

When we address fine motor skills, it includes reaching for objects, various grasps and pinches, in-hand manipulation skills, carrying objects, releasing objects and bilateral skills.

1. Reach: reaching for objects in all directions, including shoulder level, over head, below shoulder level, behind the body and crossing midline.

2. Grasp:

- Non prehensile grasp: this includes handfunctions that does not require thumb use. E.g. pushing objects, clapping hands

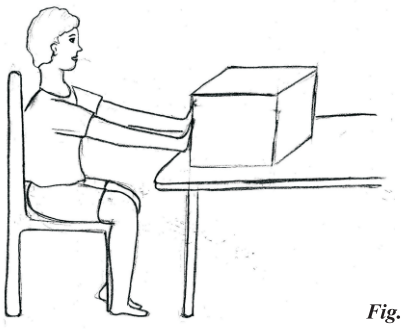


Fig. 13: *Non prehensile skill: Pushing objects*

- Prehensile grasp: this includes grasps that uses thumb. Different types of prehensile grasp are

I) Spherical grasp: holding a ball

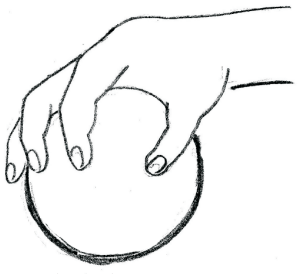


Fig. 14: *Spherical grasp*

ii) Cylindrical grasp: *holding a glass*

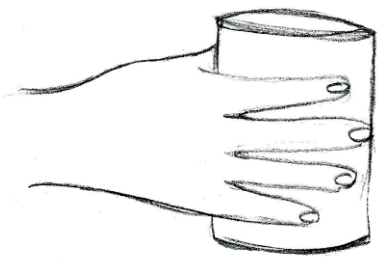


Fig. 15: *Cylindrical grasp*

iii) Diagonal grasp: *holding something diagonally across the palm of your hand e.g.holding a knife to cut cake*

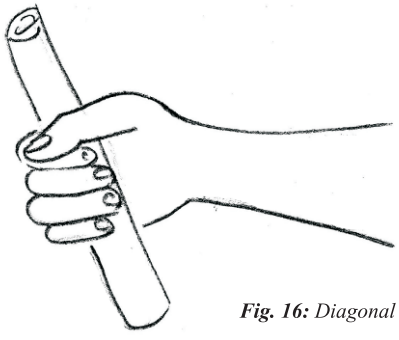


Fig. 16: *Diagonal grasp*

iv) Disc grasp: *grasp used while opening a big jar or holding a bowl from top*

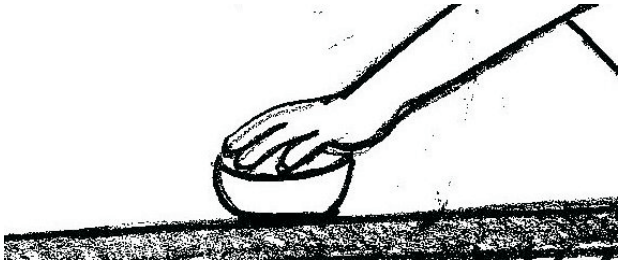


Fig. 17: *Disc grasp*

v) Hook grasp: *Object is grasped with finger alone, without the use of palm. eg:holding a bucket*

Fig. 18: 1.Hook grasp

3. Pinches: uses thumb and various fingers. Object does not touch the palm

i) Pincer grasp: holding objects between the thumb and index fingers

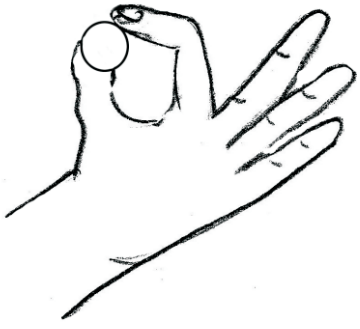


Fig. 19: *Pulp to pulp pinch*

ii) Tip to tip: picking up objects using the tip of your thumb and index fingers, for e.g. picking up a needle

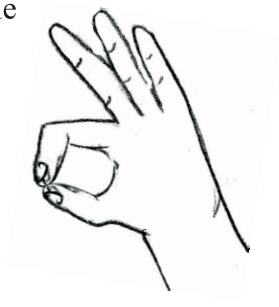


Fig. 20: *Tip to tip pinch*

iii) Lateral pinch: pad of the thumb is placed against the side of the index finger, for e.g. holding a key

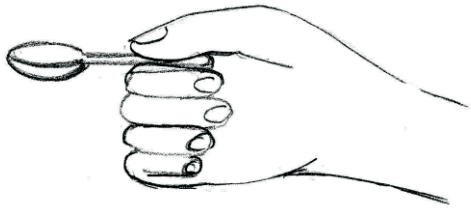


Fig. 21: *Lateral pinch*

4. In- hand manipulation skills: In-hand manipulation is the ability to move objects around in your hand, and there are three components.

i) **Translation:** The ability to move an object from the palm of the hand to the finger tips and back to the palm.

ii) **Shift:** The linear movement of an object between the fingers such as adjusting a pen or pencil after grasp so that the fingers are positioned close to the writing end of the tool

iii) **Rotation:** The movement of an object with the finger around one or more of its axis, such as when you spin a pencil around with your fingers or when you open the cap of a bottle

5. Carry: Carrying involves a smooth combination of body movements while stabilising an object in the hand.

6. Release: Release is leaving an object from the hand. This can include transferring objects between hands, releasing objects into a container and even stacking objects. Children with C. P. can have problems in precise release.

7. Bilateral hand use: Using both hands together to do an activity. e.g. throwing a ball, tying shoe lace etc.

ACTIVITIES TO IMPROVE FINE MOTOR SKILLS

The most important point to be noted before starting hand functions training is positioning the child.

➲ Positioning considerations

Consider the position that is most optimal.

Child can be placed in **supine** to facilitate general arm movements. This position will also facilitate visual regard of the hands during movement.

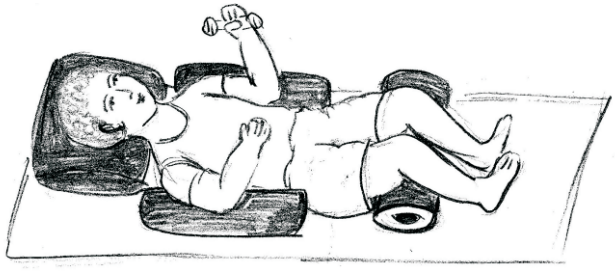


Fig. 22: *Positioning a child with C.P.in supine to facilitate generalised arm movements*

Activities given in **prone** will facilitate the following

- ❍ Prone on forearms will facilitate shoulder and neck cocontration as well as shoulder stability

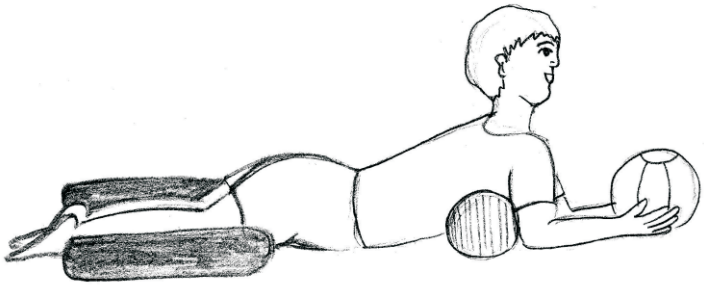


Fig. 23: *Positioning a child with C.P.in prone on forearms to facilitate shoulder stability*

- Weight bearing on the palm of one hand while using the other hand to do an activity will facilitate dissociation of the two sides of the body.

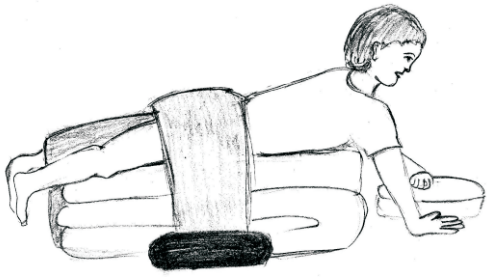


Fig.24: *Weight bearing on the palm of one hand in prone to facilitate dissociation of two sides*

Positioning the child in **sidelying** will encourage unilateral arm movement to bat at an object and for hand- to –hand play.

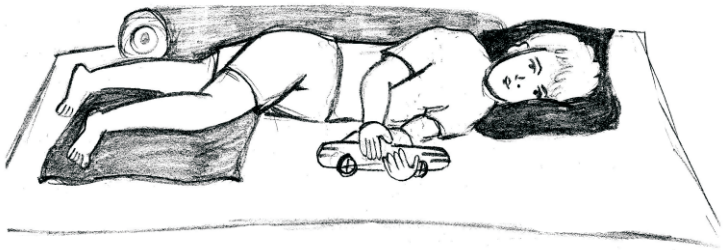


Fig.25: *Positioning a child with C.P. in side lying to facilitate unilateral arm movements*

Sitting at the table is often the most optimal position. When the trunks are fully supported the hands are free to do the activity

DO

Fig. 26 (a): *Optimal way to position a child with C.P.in sitting with trunk well supported and hands free*

DON'T

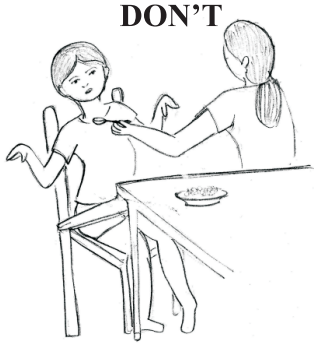


Fig.26 (b):*Positioning to be avoided in sitting*

If an adapted chair is not available at home and school, the child can be positioned in the corner of the room or using a corner stool with a lap board to do activities.

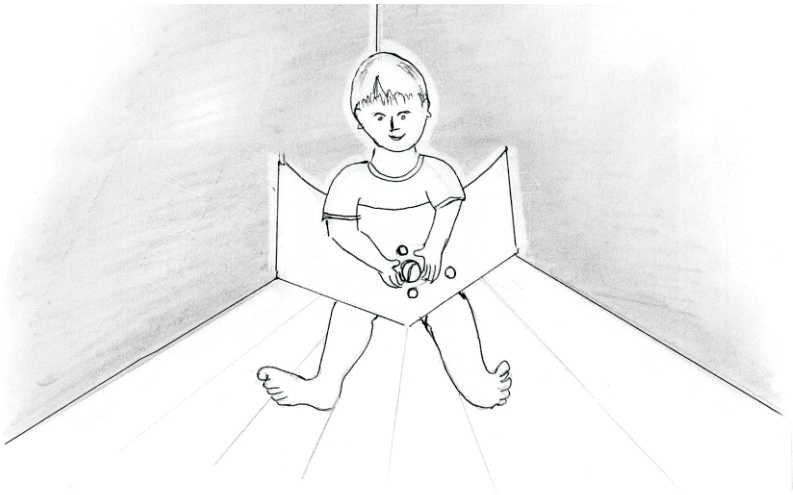


Fig.27: *Positioning the child on in the corner of the room*

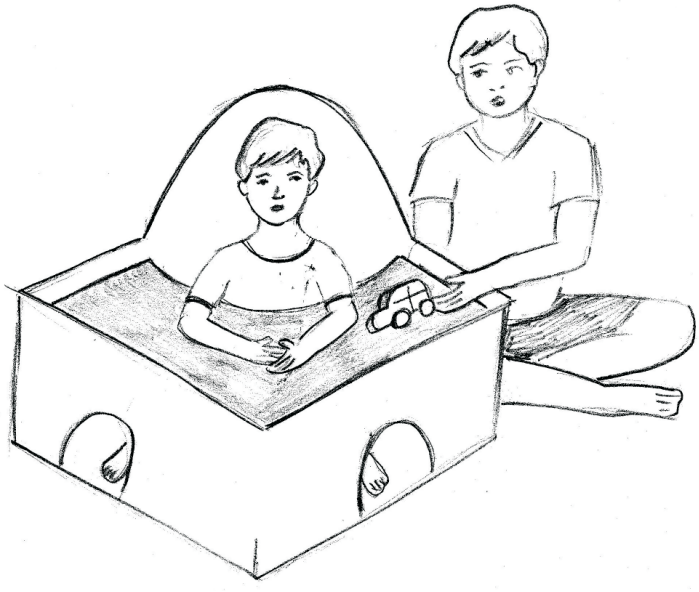


Fig.28: *Positioning using a corner stool*

➲ **Managing tone & improving postural control:**

The next problem to be addressed before hand function training is managing tone and improving postural control.

❍ Hypertonia

- *Upper extremity weight bearing and weight shifting*

Upper extremity weight bearing can be done by keeping the child in crawl position, side sitting with weight bearing on the upper limb and hands etc. Weight shifting can be done by rocking backward and forward in crawl position. In side sitting weight shifting can be done by turning the trunk towards and away from the weight bearing hand.

Fig. 29 (a):*Upper extremity weight bearing (left) in side sitting*

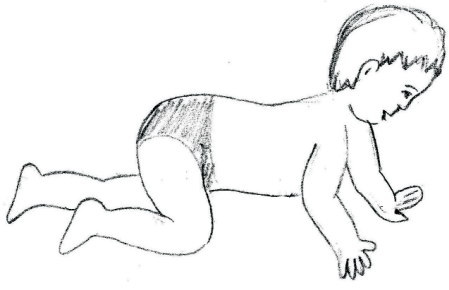


Fig.29 (b):*Upper extremity weight bearing in crawl position*

❍ Athetoid

- Upper extremity weight bearing without weight shifting , i.e. maintaining the same position
- Weighted hand cuffs
- Putting body weight on the arms while doing an activity, i.e. keeping the elbow on the table and leaning the body forward so that the body weight is on the elbows

➲ **Isolated movement control**: The educator should address specific hand movements initially like

- Elbow flexion extension

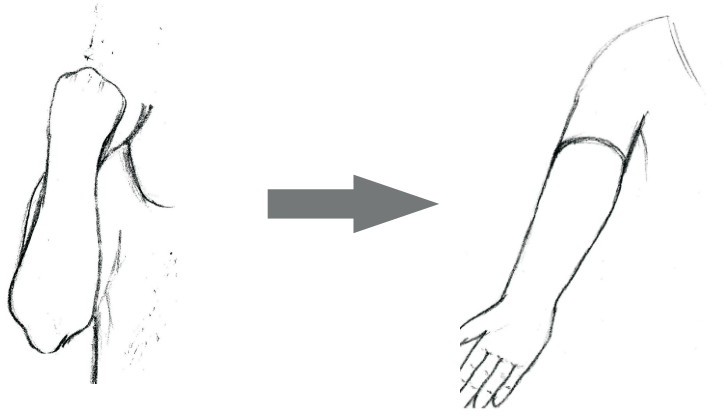


Fig. 30: *Elbow flexion- extension*

- Forearm supination pronation: supination is easiest to use when the elbow is fully flexed. Gradually extend the elbows, till it is fully extended.

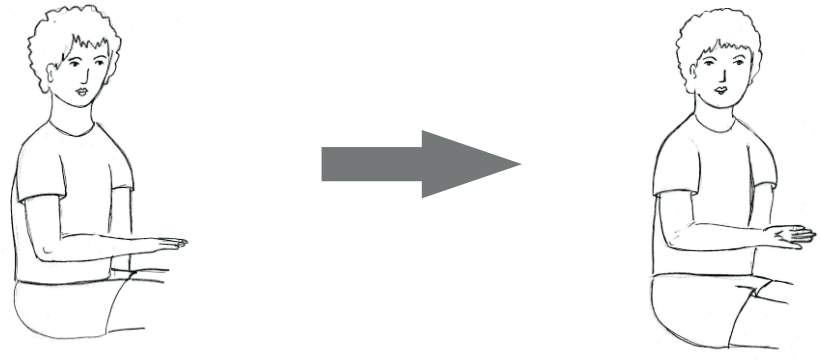


Fig. 31: *Forearm pronation- supination*

- **Reach:** the goal is for controlled initiation of arm movements. It should be started with general arm movements, then on arm and hand placement and finally on finger extension during arm movement as a precursor for reach with grasp.

❍ Emphasis

General arm movements

- Holding when placed in a position: the therapist takes the child's hand to a certain position and then leave it. Child will have to hold the limb at the position in which the therapist left the limb.

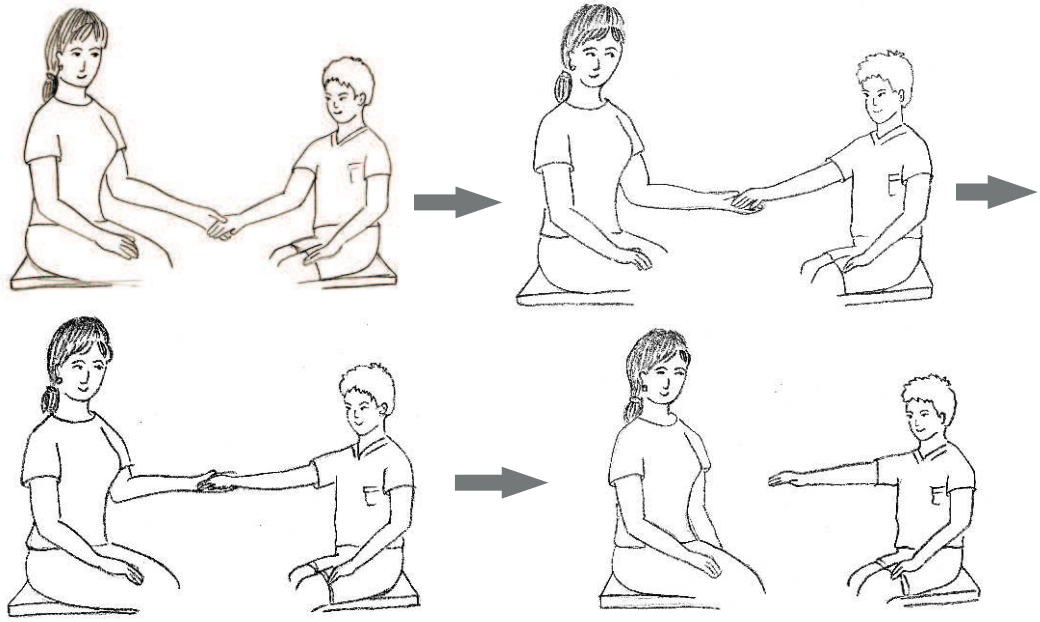
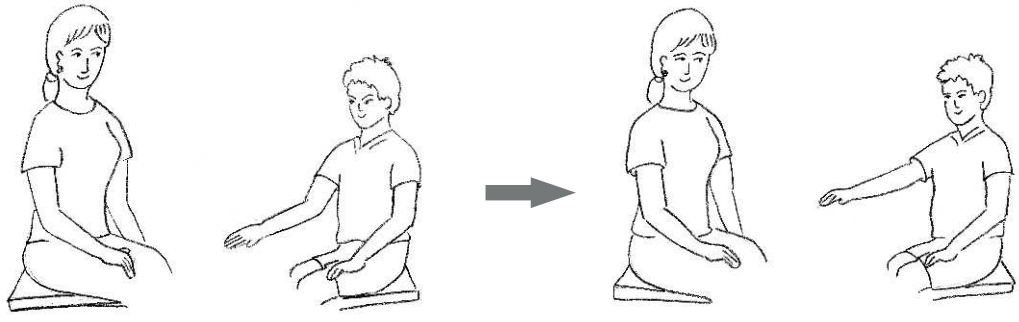


Fig. 32: *Holding when placed in a position*

Placing and holding: child himself will lift his arms up and hold it in that position



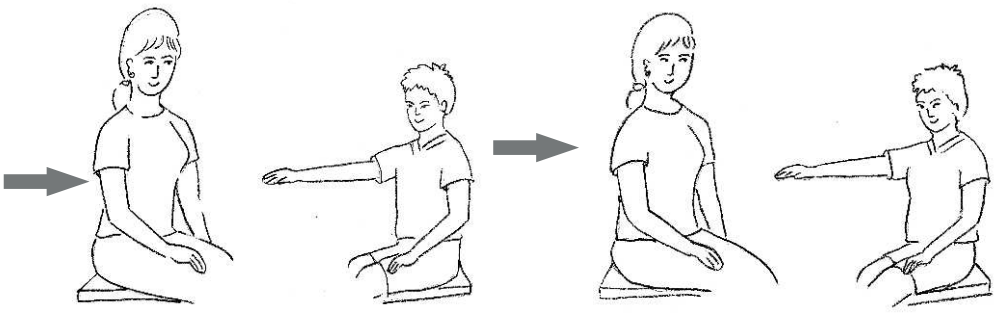


Fig. 33: *Placing and holding*

- Presentation: Initial presentation of the object should be at a level below child's shoulder. Gradually it can be raised higher. Once the child is able to do this progress on to lateral reaching (reaching sideways) and then finally behind the body.

  - Below shoulder level

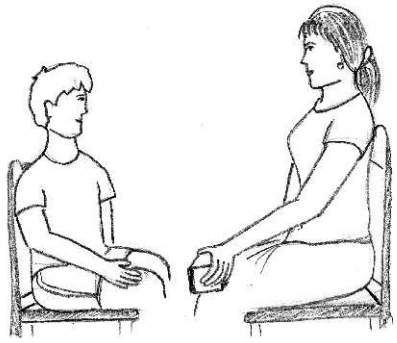


Fig. 34: *Presentation below shoulder level*

  - Raised higher

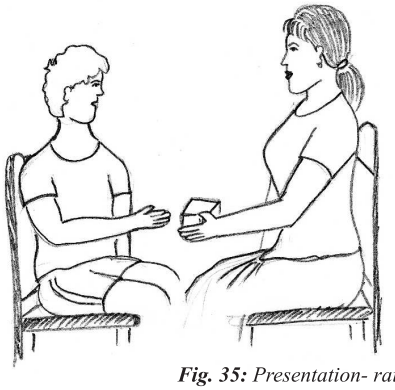


Fig. 35: *Presentation- raised higher*

- Reaching sideways

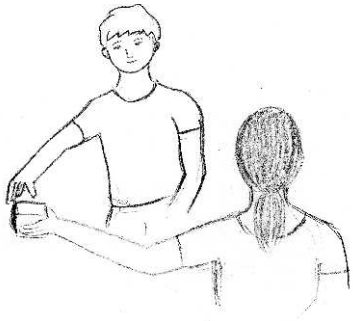


Fig. 36: *Presentation- sideways*

- Behind the body

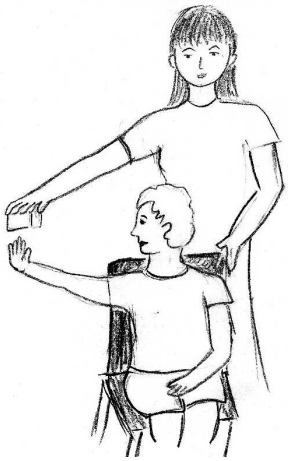


Fig. 37:.*Presentation- behind the body*

- Once the child is able to reach in all directions activities should be given at the same side initially and then crossing midline

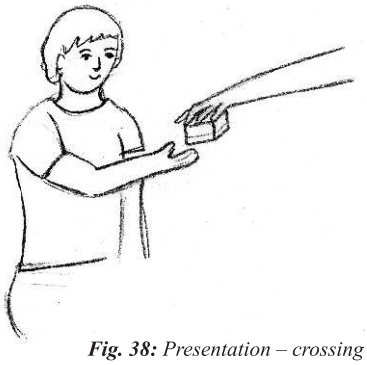


Fig. 38: *Presentation – crossing midline*

- Orient objects vertically while presenting it.
- If the child has muscle weakness, the table height should be slightly above elbow height

➲ Grasp

❍ Problems: The most common problems seen are
- Fisting
- Wrist Flexion

Fig. 39: *Fisting and wrist flexion deformity in C.P.*

- Forearm pronation, where the child cannot turn his forearm
- Thumb adduction, where the thumb is inside the palm and child cannot bring it out

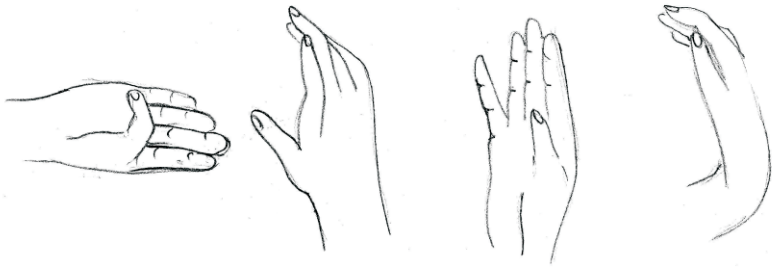


Fig. 40: *Thumb deformities in C.P.*

➲ Management

❍ Reduce finger flexion
- Weight bearing on the palm
- Abduction of the thumb i.e. taking thumb away from the palm

Fig. 41: *Abduction of the thumb*

- If the child can independently open the hand but has wrist flexion along with it
  - Squeezing clay, ball with wrist straight

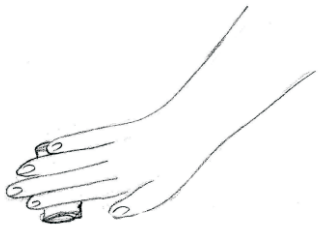


Fig. 42: *Rolling clay with fingers with wrist held straight*

  - Move the arm while moving the object

- Use a finger surface grasp on a variety of objects like Pulp to pulp and tripod

Fig. 43: *Pulp to pulp (pincer) pinch*

- Use different shapes objects for grasp development

Fig. 44 (a): *Spherical grasp*

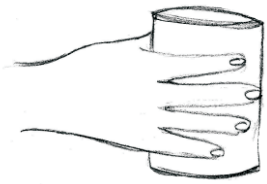


Fig. 44 (b): *Cylindrical grasp*

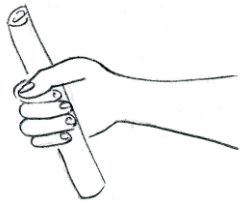
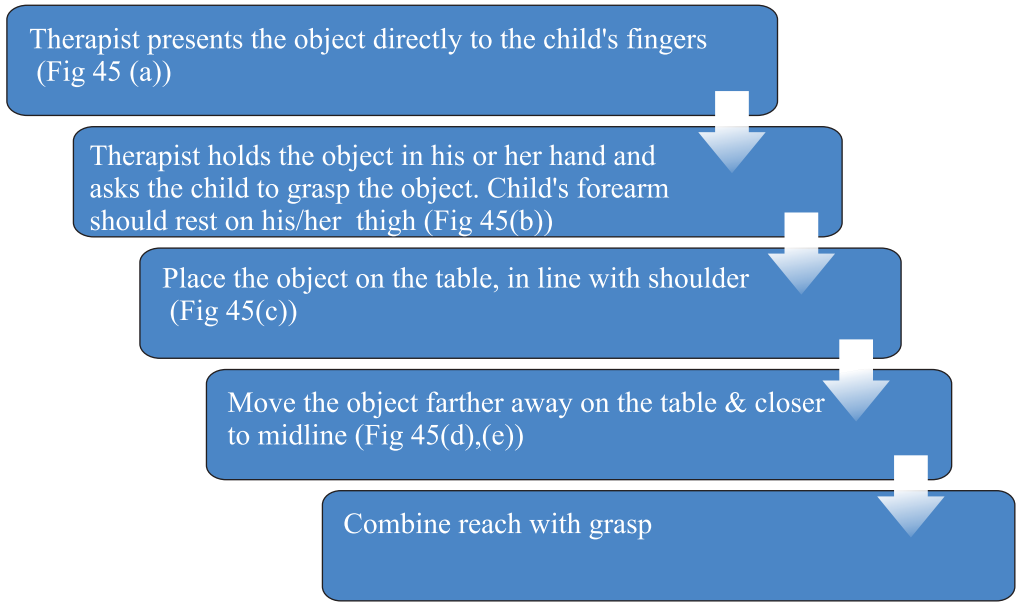


Fig. 44 (c): *Diagonal grasp*

If the child is not able to grasp any object at all the therapy can be progresses as shown in the table below



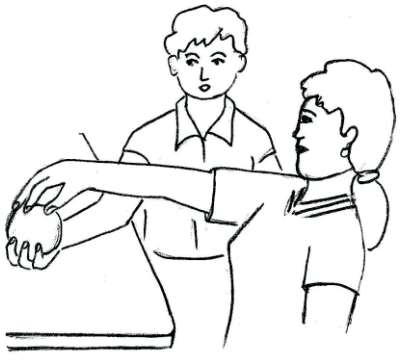


Fig. 45(a): *Therapist presents the object directly to the child's fingers*

Fig. 45(b): *Therapist holds the object in his or her hand and asks the child to grasp the object. Child's forearm should rest on his/her thigh*

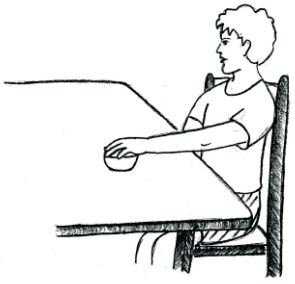


Fig. 45(c):*Placing the object on the table, in line with shoulder*

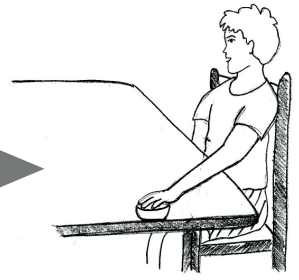


Fig. 45(d):*Move the object farther away on the table*

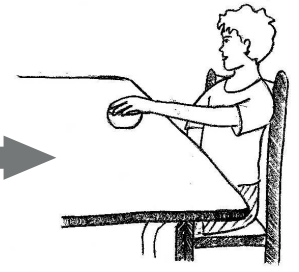


Fig. 45(e):*Move the object closer to midline*

The other pinches and grasps that can be worked on are

- Lateral Pinch: The pad of the thumb against the side of the index finger like holding a spoon.

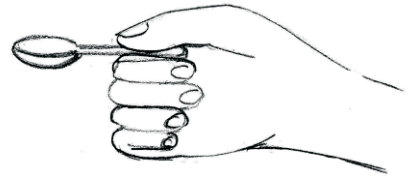


Fig. 46: *Lateral pinch*

- Use a grasp with fingers straight to hold thin flat objects

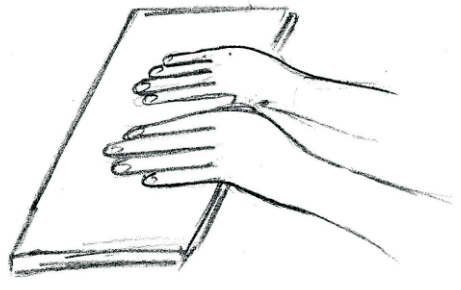


Fig. 47: *Holding a paper with fingers straight*

➲ Activities to strengthen hand muscles

- Holding fingers in adduction & extension while rolling clay, dough etc. i.e. fingers straight and close together

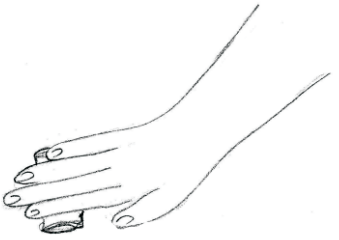


Fig. 48: *Rolling clay with fingers straight and close together*

- Finger excercises with rubber band

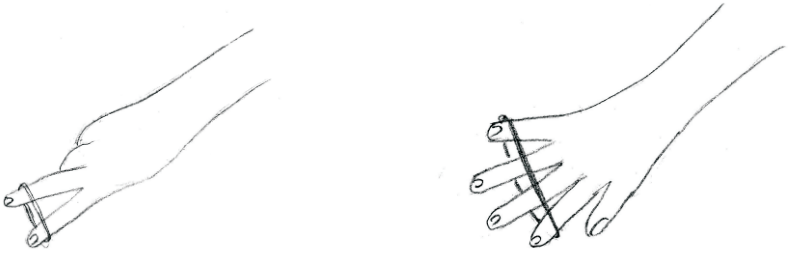


Fig. 49: *Finger exercises with rubber band*

- Squeezing clay between pad of thumb & fingers

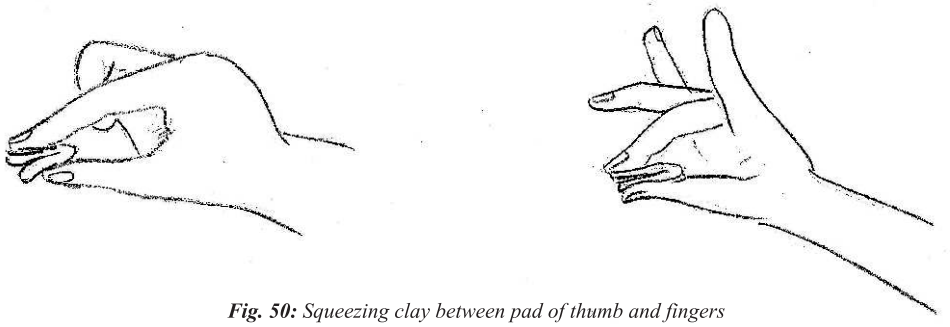


Fig. 50: *Squeezing clay between pad of thumb and fingers*

➲ **Release:** Releasing objects can be progressed as follows

- Release objects into a container with the container placed on floor

Fig. 51: *Releasing objects into a container with the container placed on floor*

- Release the object into a container placed on a table surface with the containers at arm's length

Fig. 52: *Releasing object into a container placed on a table surface with the container at arm's length*

- Container at midline

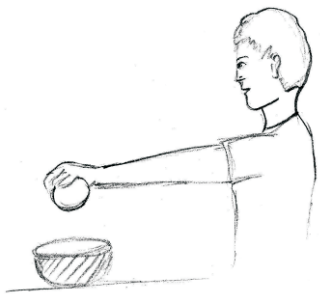


Fig. 53: *Releasing with the container at midline*

- Release many tiny objects into a container with a small opening

Fig. 54: *Releasing many tiny objects into a container with a small opening*

- Place objects within 1 inch of other objects

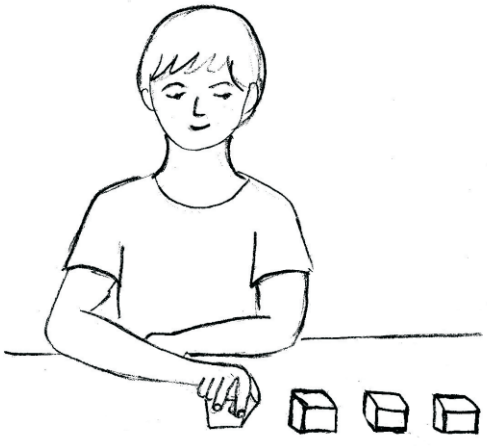


Fig. 55: *Placing objects within 1 inch of other objects*

- Stack Cubes

Fig. 56: *Stacking cubes*

- Release unstable, light weight objects like disposable cups while keeping them in an upright position

Fig. 57: *Release unstable, light weight objects like disposable cups*

➲ Bilateral hand use

- ❍ Bring hands together to midline for grasp of a medium or large sized object

Fig. 58: *Holding a ball at midline*

- ❍ Use both hands together to push large objects

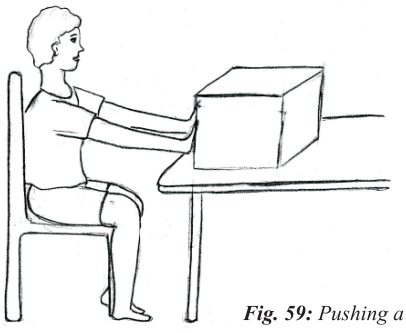


Fig. 59: *Pushing a large object*

- ❍ Stabilize with one hand & manipulate with the other hand. e.g. putting rings on a dowel while holding it.

Fig. 60: *Putting ring on a dowel with one hand while the other hand stabilises the dowel*

- Stabilize material using palmar grasp while manipulating with the other. E.g. pretend play, where the child holds a pan and stirs with the other hand.

Fig. 61: *Stabilising object using palmar grasp with one hand while the other manipulates*

- Stabilizing objects with a variety of grasp patterns while other manipulates
- Both hands doing different actions. E.g. stringing beads, lacing shoes

Fig. 62 (a):*Lacing shoes*

Fig. 62 (b): *Stringing beads*

➲ Adaptations and modifications

(to be used under the guidance of a physiatrist or occupational therapist)

- ❍ Resting pan splint : To be worn in the night, to reduce tightness and prevent deformities

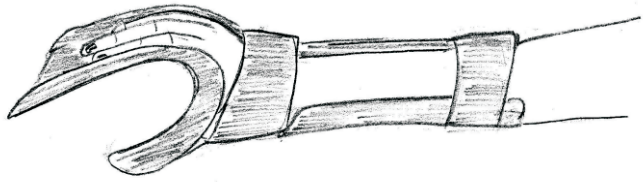


Fig. 63: *Resting pan splint*

- ❍ Dorsal cock up splint: keeps the wrist joint straight. To be used when the child cannot control his wrist joints

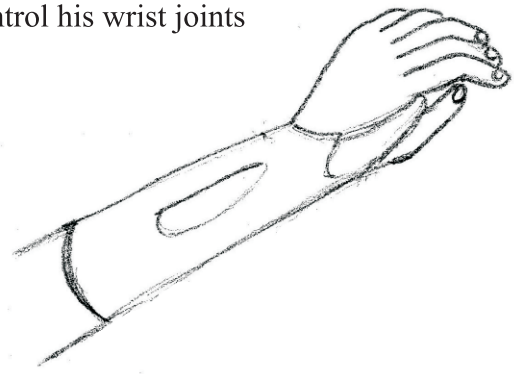


Fig. 64: *Dorsal cock up splint*

- ❍ Opponens splint: when the thumb is in the palm and the child cannot oppose it with other fingers to grasp objects, this splint can be used.

Fig. 65: *Opponens splint*

- Built up handles: when the child has poor grasp

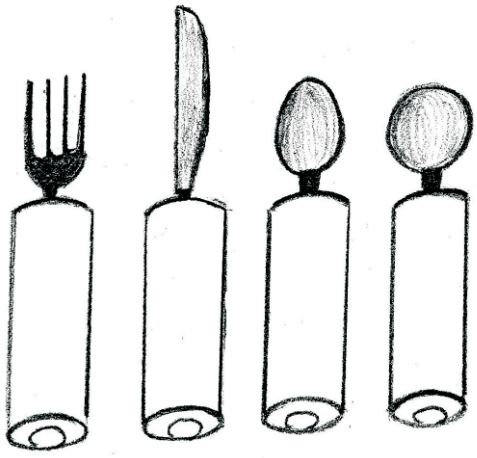


Fig. 66: *Built up handles*

- Universal cuff if the child does not have any grasp but some control over the elbows

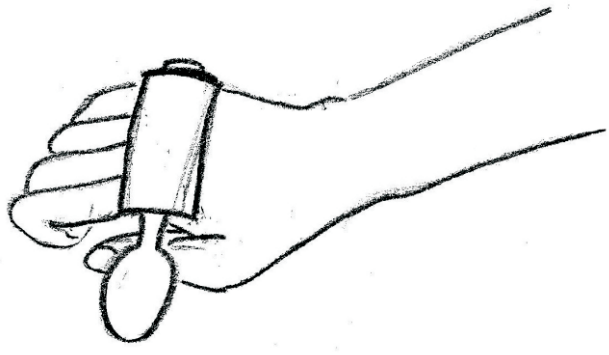


Fig. 67: *Universal cuff*

PLAY

Children learn best through play. Through play children can learn about concepts as well as can improve their gross and fine motor skills.

Points to remember

- Position the child using appropriate adapted equipments such as wedges, rolls, C.P. chairs etc.
- Make certain your child changes positions frequently. Children should play on the floor as well as in a chair.
- Position your child with both arms forward when playing with toys. If you are guiding the child's hands, make certain that the child can see what is happening.
- Play games that encourage crawling. Weight-bearing on one hand or both hands and on legs is beneficial for developing a good muscle tone.
- Talk to your child at the child's eye level.
- Give your child ample time to respond to what you say.
- Maintain a good balance between noisy, active play and quieter, less strenuous activities.
- Present toys that encourage your child to reach and grasp with the hand that is more difficult to use, but allow the child to use whichever hand he chooses.
- Encourage two-handed activities such as rolling clay or throwing a large ball
- Children with physical difficulties need to get stimulation from as many sources as possible; provide toys that have interesting things to see, hear and feel.

- Adapted toys can be purchased or made which will allow your child to manipulate or control play. Velcro pieces sewn on mitts or blocks, pegs attached to puzzles and switch toys should be available to give your child a sense of real control over the environment.
- Look for toys that have large handles or knobs to grasp. They are typically easier to use. In addition, there are large-handled paint brushes available in stores that are easier to hold.
- Play games with balls to develop good coordination and motor skills.
- Look for toys that are easy to activate. Complicated actions can be frustrating. Particularly appropriate are electronic and switch toys that can be activated with a light touch from a closed fist.
- Look for toys that can be used with one hand if it is difficult for the child to do two-handed play. For example, musical instruments such as shaker or tambourine.

Activities

- Playing with rattles: helps in grasping, orienting to sounds
- Peek –a boo: hand functions, social skills
- Organ/key board : individual finger movements
- Putting beads through a tube: eye hand co-ordination
- Matching shapes, colours
- Stacking rings, cubes: hand functions
- Pretend play
- Play –doh
- Sand play
- Rice, beans

Here are some guidelines to help in toy selection:

1. Multi-sensory appeal
Does the toy respond with lights, sounds, or movement to engage the child? Are there contrasting colors? Does it have a scent? Is there texture?

2. Method of activation
Will the toy provide a challenge without frustration? What is the force required to activate? What are the number and complexity of steps required to activate?

3. Places the toy will be used
Will the toy be easy to store? Is there space in the home? Can the toy be used in a variety of positions such as side-lying or on a wheelchair tray?

4. Opportunities for success
Can play be open-ended with no definite right or wrong way? Is it adaptable to the child's individual style, ability, and pace?

5. Current popularity
Is it a toy that will help the child with disabilities feel like "any other kid?" Does it tie in with other activities like books and art sets that promote other forms of play?

6. Self-expression
Does the toy allow for creativity, uniqueness, and making choices? Will it give the child experience with a variety of media?

7. Adjustability
Does it have adjustable height, sound volume, speed, and level of difficulty?

8. Child's individual abilities
Does the toy provide activities that reflect both developmental and chronological ages? Does it reflect the child's interests and age?

9. Safety and durability
Does the toy fit with the child's size and strength? Does it have moisture resistance? Is the toy and its parts sized appropriately? Can it be washed and cleaned?

10. Potential for interaction
Will the child be an active participant during use? Will the toy encourage social engagement with others?

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