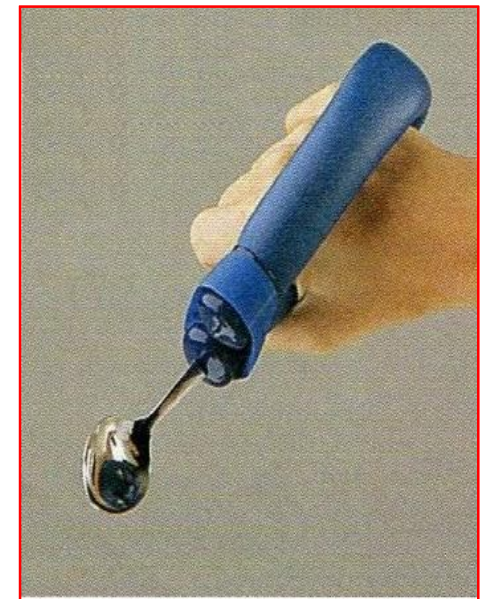


Management of upper limb in cerebral palsy

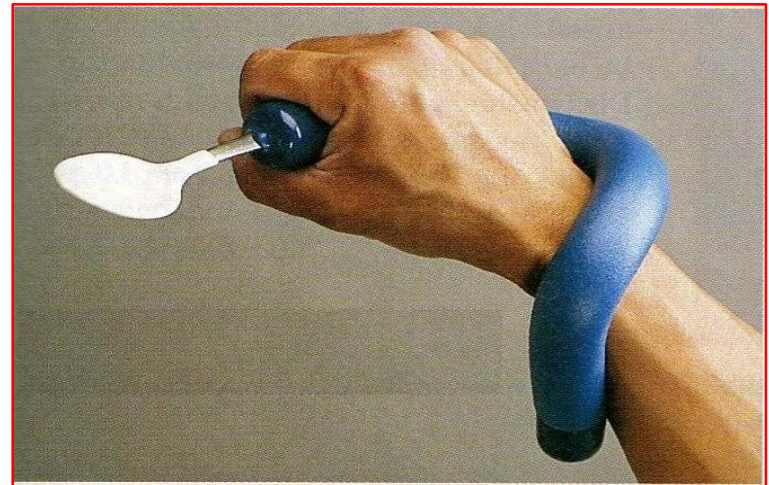
Dr Sameer Desai

Pediatric Orthopedic Surgeon
KEM, Ruby Hall, Sahyadri
Hospital, Unique Childrens
Hospital



Importance of upper limb in CP

- Activities of daily living
- Feeding
- Toilet care
- Walker and wheelchair
- Support hand



Problems in upper limb

- Shoulder adduction and internal rotation contracture
- Elbow flexion contracture
- Forearm pronation
- Wrist palmer flexion
- Finger flexion
- Thumb in palm



Aims and objectives

- Document improvement in hand and upper limb function using Botulinum toxin A or surgical approach in children with cerebral palsy

Material and Methods

- 20 children diagnosed with spastic type of cerebral palsy with upper limb involvement
- Age 3 yrs-18 yrs.
- Follow up of 1-4 yrs.
- All children were undergoing regular physiotherapy
- 8 Children-**less than 8 yrs** - with spasticity were injected with Botulinim toxin A
- 12 Children-**more than 8 yrs**. were operated

Botulinum toxin A - 8 children

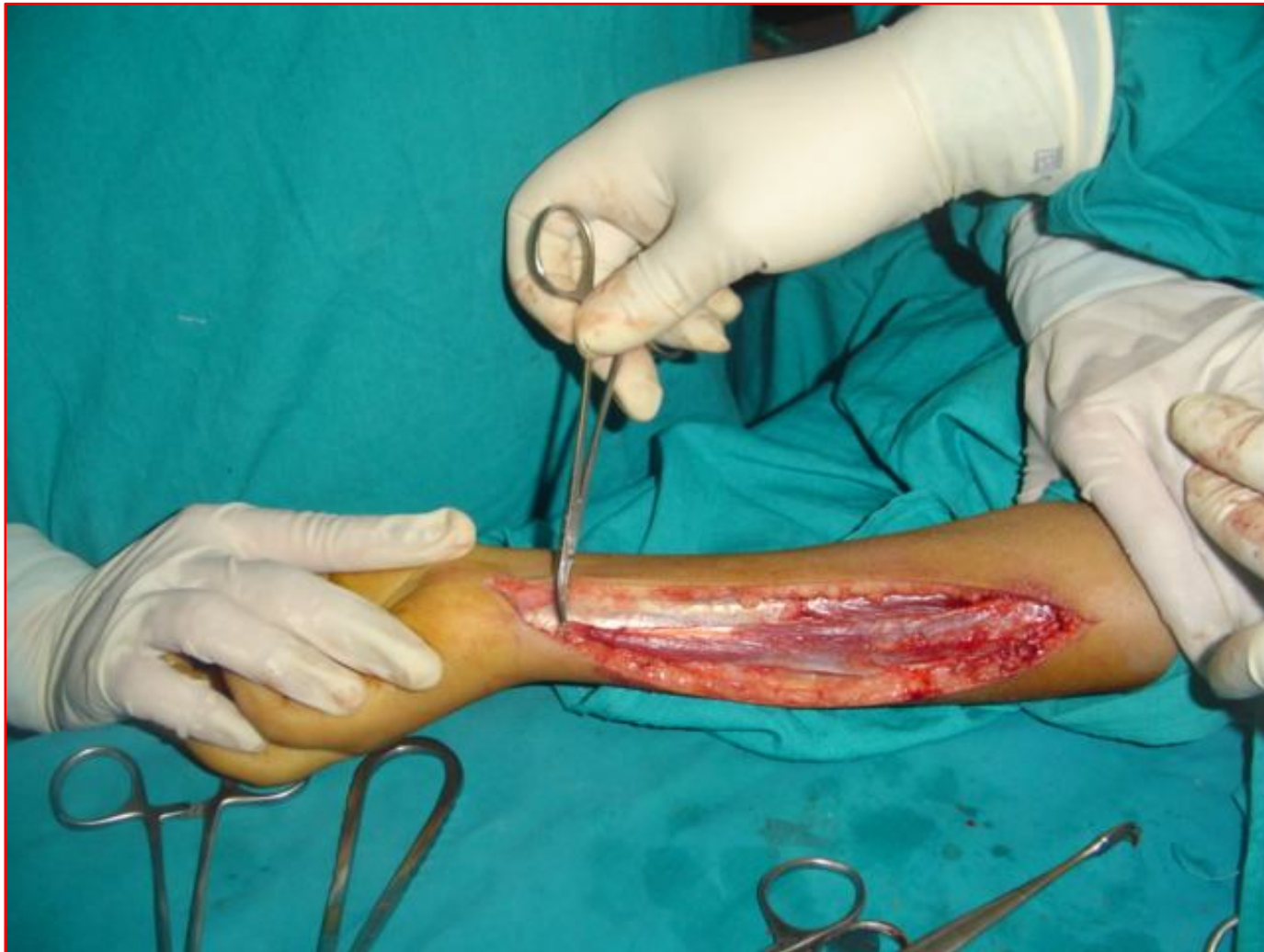
- Pronator teres -8
- Wrist flexors- 6
- Biceps-2
- Thumb adductors-2
- Pectoralis-1



Surgery - 12 children

- Pronator release- 5 cases
- Flexor carpi ulnaris to extensor carpi radialis brevis transfer – 12 cases
- Biceps aponeurotic release – 1 case
- Thumb adductor release – 1 case

Flexor carpi ulnaris (FCU) to extensor carpi radialis brevis transfer(ECRB)



Flexor carpi ulnaris to extensor carpi radialis brevis transfer



Flexor carpi ulnaris to extensor carpi radialis brevis transfer

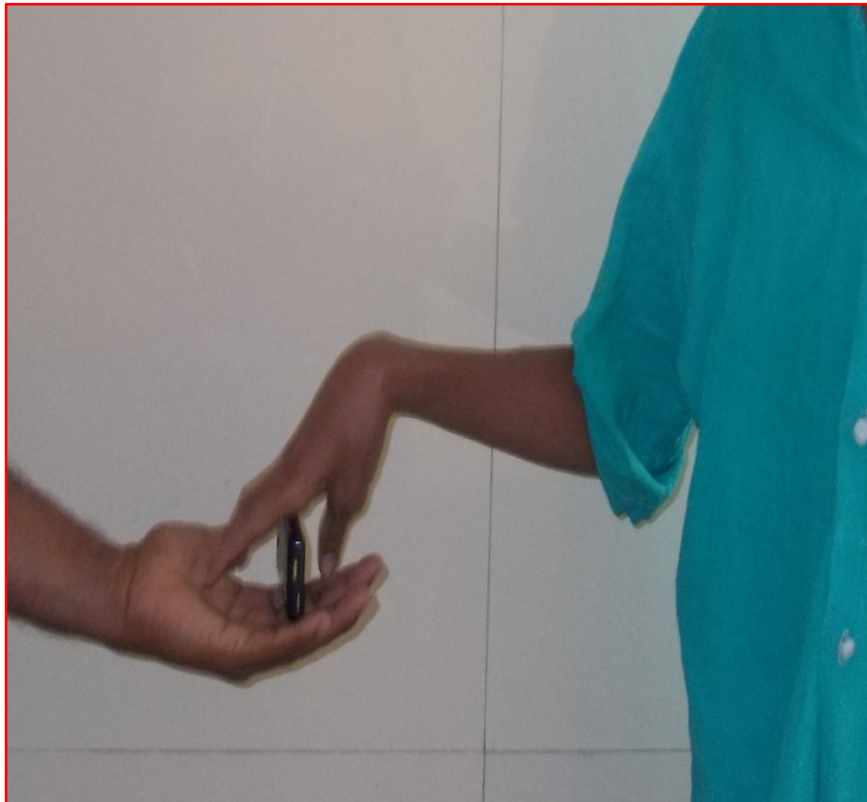


Flexor carpi ulnaris (FCU) to extensor carpi radialis brevis transfer(ECRB)



Flexor carpi ulnaris to extensor carpi radialis brevis transfer

Before surgery



After surgery



Results

- Mean improvement in range of supination: 40 degrees
- Mean improvement in wrist dorsiflexion: 50 degrees
- Mean improvement in elbow extension: 30 degrees

House scoring system of upper extremity functional use

Level	Category	Description
0	Does not use	Does not use
1	Poor passive assist	Uses as stabilizing weight only
2	Fair passive assist	Can hold object placed in hand
3	Good passive assist	Can hold object and stabilize it for use by other hand
4	Poor active assist	Can actively grasp object and hold it weakly
5	Fair active assist	Can actively grasp object and stabilize it well
6	Good active assist	Can actively grasp object and manipulate it
7	Spontaneous use, partial	Can perform bimanual activities and occasionally uses hand spontaneously
8	Spontaneous use, complete	Uses hand completely independently without preference

Results

Supination

	before (Passive)	After (passive)	Before (active)	After (active)
Botulinum toxin A	neutral	Full supination	20 deg pronation	
Surgical group				

Botulinum Toxin A

Before Botox



After Botox



Surgery - House scoring system of upper extremity functional use

Level	Category	Description	before	after
0	Does not use	Does not use		
1	Poor passive assist	Uses as stabilizing weight only		
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7	Spontaneous use, partial	Can perform bimanual activities and occasionally uses hand spontaneously		
8	Spontaneous use, complete	Uses hand completely independently without preference		

After FCU to ECRB transfer

After FCU to ECRB transfer

Before Surgery

After Surgery

Conclusion

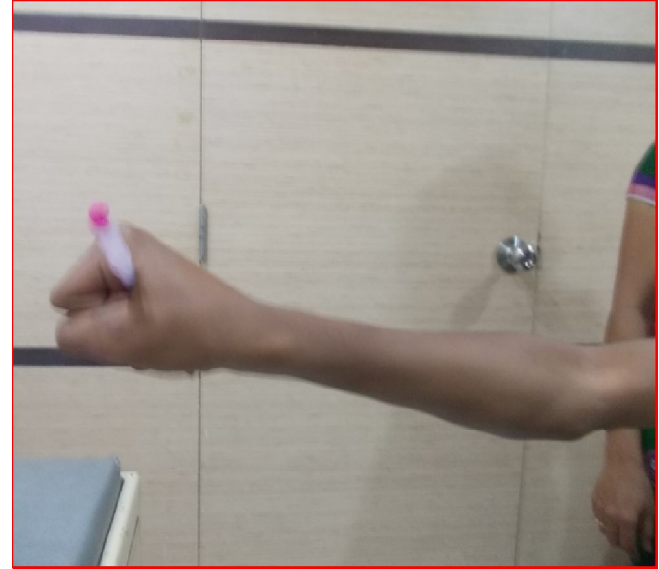
- Both Botulinum Toxin A and Surgery improved the upper extremity functional use
- Duration of action of Botox for upper limb was short lived
- Full active supination was not possible even after botox or release of pronator
- Tendon transfer to augment supinator action can be considered

Conclusion

- Early surgical transfer (Before 12 yrs.) can lead to late deformities like wrist extension contracture and supination contracture
- Tendon transfer may be required for thumb in palm deformity
- An accurate assessment of hand sensation, power and spasticity is essential to get the best results

Literature Review

- **Upper extremity spasticity in children with cerebral palsy: a randomized, double-blind, placebo-controlled study of the short-term outcomes of treatment with botulinum a toxin.** Koman LA, Smith BP, Williams R, Richardson R, Naughton M, Griffin L, Evans P.J Hand Surg Am. 2013 Mar;38(3):435-446.
- **Arm and hand function in children with unilateral cerebral palsy: a one-year follow-up study.** Klingel Dev Med Child Neurol. 2006 Jun;48(6):533-9
- **Management of the upper limb in cerebral palsy.** Chin TY, Duncan JA, Johnstone BR, Graham HK. J Pediatr Orthop B. 2005 Nov;14(6):389-404
- **Late deformities following the transfer of the flexor carpi ulnaris to the extensor carpi radialis brevis in children with cerebral palsy.** Patterson JM, Wang AA, Hutchinson DT. J Hand Surg Am. 2010 Nov;35(11):1774-8. doi: 10.1016/j.jhssa.2010.07.014



Thank YOU

