

Case Report

Title: Post-Intervention Hand Function in Children with Cerebral Palsy: Relationships with Daily Performance and Predictors of Functional Outcomes.

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Background

In cities like Karachi, children with cerebral palsy often struggle to use their hands properly. This makes everyday activities, eating independently, doing schoolwork, or playing, very difficult. Long-term studies of hemiplegic cerebral palsy show only slight natural improvement in hand function over the years. Grip patterns may become a little more advanced, but the weaker hand is rarely used more in daily life without active help. [1]. There is a common gap between what a child can do in a clinic test and what they actually do at home when treatment is limited to therapy or medicine.

At Dr Ziauddin Hospital (Clifton, Karachi), we perform single-event multilevel upper limb surgery (SEMLS) in selected children. Surgery corrects multiple issues at once (tight wrists, turned-in forearms, thumb-in-palm deformity) to improve positioning, grasping, releasing, and bimanual use.

Post-surgery physiotherapy helps maintain gains and encourages real-world use. This is especially important in our setting, where consistent therapy access can be challenging. [2,3]. Spastic cerebral palsy usually responds better than cases with dystonia or mixed tone, where outcomes vary more. [4]

Objective

To observe changes in hand and arm function after SEMLS in a very small

group of children with cerebral palsy, identify possible predictors of better results, assess parent-reported daily hand use and satisfaction, and explore whether good physiotherapy follow-through seemed to help maintain improvements.

Methods

We followed 5 children with cerebral palsy (MACS levels II, III, average age 7.6 years, 3 boys and 2 girls) who had upper limb SEMLS carried out by one surgeon, Prof. Dr. Anisuddin Bhatti, at the Department of Orthopaedics, Dr Ziauddin Hospital, Clifton, Karachi. The types were: spastic hemiplegic (3), spastic diplegic (1), and mixed spastic-dystonic (1).

The operation included tendon transfers, muscle releases or rerouting, and joint stabilisations as needed for each child. Physiotherapy began in hospital straight after surgery (pain relief, gentle passive movement, correct positioning), then continued as outpatient sessions, usually 3 to 5 times a week at the start, with active exercises, strengthening, practice using both hands, splint management, and training for parents on home activities. Later sessions focused more on practical daily tasks such as feeding or buttoning clothes.

We examined the children before surgery (T_0), at 3 months (T_1), and at 6 months (T_2) using four standard tests:

- QUEST (0-100): measures what the hand can do

- AHA (0-100): checks how well both hands work together
- ABILHAND-Kids (logit scale): parents rate everyday hand tasks
- SHUEE dynamic subscale (0-100): looks at grasp and positioning during movement

Parents also scored how much daily hand use had improved (simple 0-10 scale) and gave their overall satisfaction (1 = very dissatisfied, 10 = very satisfied Likert). We analysed changes over time with mixed-effects models and looked at basic links with correlations and regression. The hospital ethics committee gave approval and every parent gave written consent.

Results

Hand capacity improved clearly after surgery. QUEST scores rose by about 18 points on average (from 60.7 ± 11.5 to 78.7, p = 0.002) and SHUEE dynamic scores increased by roughly 7 points (p =

0.008). Improvements in using both hands together and parents’ views of daily ability were smaller but still noticeable (AHA +7.8 points, p = 0.003; ABILHAND-Kids +1.3 logits, p = 0.04). The connection between better capacity and better daily use was only moderate (r = 0.50).

Parents reported that daily hand use got easier by around 3 points on the 0-10 scale (p = 0.04). Self-feeding and buttoning clothes were the activities most often mentioned as improved. At 6 months, average parent satisfaction was 7.5 out of 10, and 40% gave a score of 8 or higher. Families who said they followed physiotherapy sessions and home exercises more closely tended to keep their QUEST gains better (r = 0.58). Children with spastic hemiplegic cerebral palsy generally showed larger improvements than those with mixed spastic-dystonic type, though the small numbers in some groups limit what we can conclude. There were no serious complications during the follow-up.

Age (mean ± SD)	7.6 ± 2.1 years	
Male/Female	3 / 2	
MACS level II / III	3 / 2	
Dominant side affected	3	
Other conditions (e.g. seizures)	1	
Type of cerebral palsy	Spastic hemiplegic	3
	Spastic diplegic	1
	Mixed spastic-dystonic	1

	Before surgery	3 months	6 months	Change	p-value
QUEST (0-100)	60.7 ± 11.5	77.2 ± 10.8	78.7 ± 11.2	+18.0	0.002
AHA (0-100)	27.2 ± 13.1	35.0 ± 12.4	35.0 ± 12.8	+7.8	0.03
ABILHAND-Kids (logits)	1.8 ± 1.4	3.1 ± 1.3	3.1 ± 1.4	+1.3	0.04
SHUEE Dynamic (0-100)	53.5 ± 14.0	60.6 ± 13.5	60.6 ± 13.8	+7.1	0.008

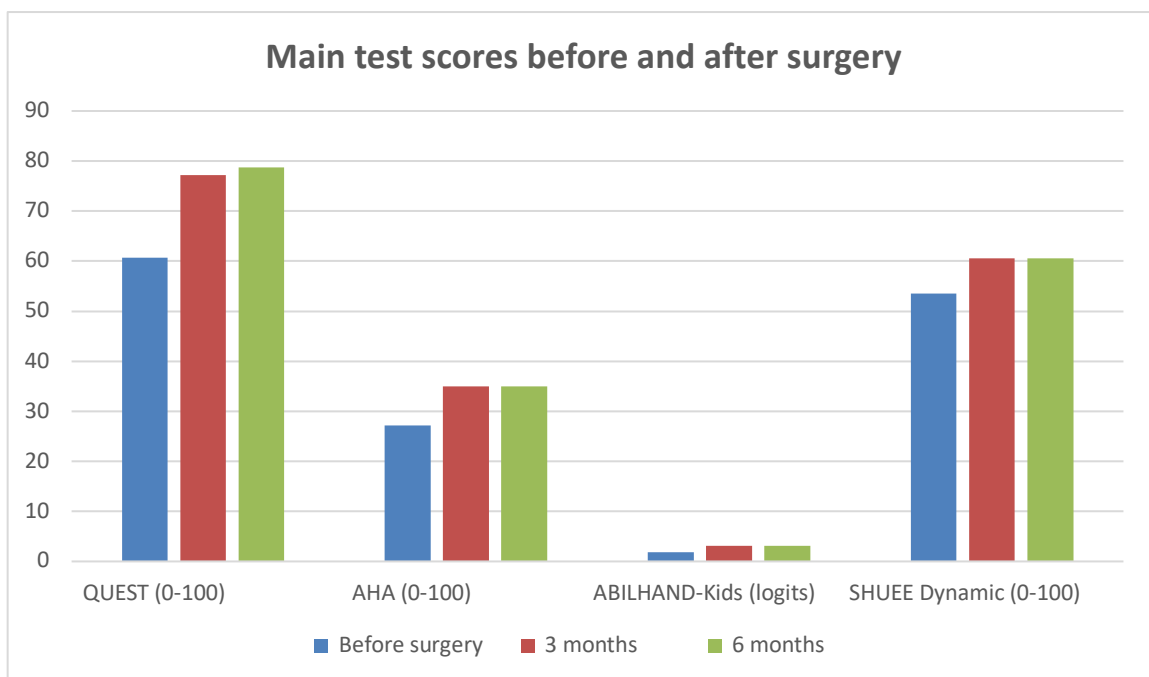


Table 3: Parents’ views and physiotherapy (mean ± SD or %)

	3 months	6 months
Daily use improvement (0-10 scale)	4.8 ± 1.4	5.8 ± 1.6
	Overall change +3.0 (p=0.04)	
Parent satisfaction (1-10)	7.0 ± 1.8	7.5 ± 1.9
Parents scoring 8 or higher	40%	40%
Outpatient physiotherapy sessions (total by 6 months)	-	11.7 ± 4.2
Home exercise adherence (%)	70 ± 14	78 ± 13

Discussion

The gains we saw in hand capacity (QUEST and SHUEE) match what other teams have found after similar multilevel upper limb surgery in children with cerebral palsy. [2,7] However, the changes in how the children actually used their hands every day were smaller, and the link between clinic test results and real-life use stayed only moderate, exactly what long-term studies have also shown. [1]

When families managed to attend physiotherapy sessions and do the home exercises more regularly, the children tended to keep their improvements better. But because this is a small observational study without a comparison group, we cannot be certain that physiotherapy alone caused the difference. Parents were generally pleased with the outcome, they noticed better hand appearance, less need to help their child, and more confidence,

which is similar to what families report in other studies. [6]

There are important limitations. With only 5 children the study is small, follow-up is short (just 6 months), and everything was done at one hospital by one surgeon, so the results may not apply everywhere. Some parent rating scales were simple and not formally validated. Comparisons between different types of cerebral palsy are only suggestions because some groups had very few children. These findings should be seen as early observations that need larger, longer studies to confirm.

Conclusion

In this small group of children, upper limb SEMLS was linked with worthwhile improvements in hand capacity and more modest gains in using both hands together and daily tasks at 6 months. Closer follow-through with physiotherapy appeared

connected to holding onto those gains, and most parents felt satisfied with the results. Larger studies with longer follow-up, better comparison groups, and more precise ways to measure therapy are needed to understand these findings properly, especially in places like Pakistan where access to ongoing treatment can be challenging.

Limitations

- Very small sample (n=5)
- Short follow-up (6 months)
- Single-surgeon, single-center design
- Some parent scales were simple and not formally validated

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