Management of Pediatric Brachial Plexus Palsy: the Role of Nerve Transfer Combined with Neurolysis or Nerve Grafting of the Upper Trunk

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BACKGROUND

The role of axon transfer from regional nerves is poorly defined in treatment of pediatric brachial plexus palsy. This study evaluates the benefit of nerve transfer in combination with either neurolysis or nerve grafting of the upper trunk.

METHODS

A retrospective review of pediatric upper brachial plexus palsy patients was performed from 1997-2012. Patients treated with neurolysis or nerve grafting of the upper trunk with or without nerve transfers were identified (n=39). All patients had 4 months minimum n prior to operative intervention.

	Group 1: Neurolysis	Group 2: Neurolysis + transfer	Group 3: Grafting*	Group 4: Grafting* + transfer
Number of patients	12	9	8	10
% female	50.0	44.4	37.5	70.0
Age (months)	9.7	6.8	6.6	6.5
Number of nerve transfers	0	13	0	13
CN XI	---	1 (11%)	---	4 (40%)
phrenic	---	4 (44%)	---	3 (30%)
combined	---	4 (44%)	---	3 (30%)

*sural nerve

	Group 1: Neurolysis	Group 2: Neurolysis + transfer	Group 3: Grafting*	Group 4: Grafting* + transfer
Follow-up (months)	55.9	35.0	41.0	55.9
Number of tendon transfers	9 (70%)	6 (67%)	3 (38%)	3 (30%)
Age at transfer (months)	39.1	33.4	30.0	32.0
Complications (%)	0	0	0	0

*sural nerve

RESULTS

Group 1, neurolysis, 12 patients (4 male/8 female, average 9.7 months) treated January 1997-March 2012. Group neurolysis w/ nerve transfer, 9 patients (5 male/4 female, average 6.8 months) treated December 2001-January 2007; transfers included 1 CN XI, 4 phrenic, and 4 combined procedures. Group 3, nerve grafting, 8 patients (5 male/3 female, average 6.6 months) treated September 2000-May 2012; sural nerve grafts were used. Group 4, nerve graft w/ nerve transfer, 10 patients (3 male/7 female, average 6.5 months) treated March 2000-April 2012; sural nerve grafts were used and transfers included 4 CN XI, 3 phrenic, and 3 combined procedures (age/gender distribution, p>0.05 all groups). Average follow-up was 55.9, 35.0, 41.0, and 55.9 months for Groups 1-4, respectively. Median preop/postop shoulder abduction, shoulder external rotation, supination, and elbow flexion Oxford scores were 2/2.5, 0/3.5, 0/2.0, 1/3 in Group 1; 2/4, 1/3, 2/4, 4/4 in Group 2; 3.5/4, 2/3.5, 2/4, 2.5/4 in Grou 3; and 2/5, 2/5, 0/4, 2/5 in Group 4, respectively (p>0.05 all groups). Upper extremity functional scores demonstrated greatest improvement in Group 4 relative to all other groups (p<0.036). Tendon transfer occurred n= (70%) in Group 1 at 39.1 months, n=6 (67%) in Group 2 at 33.4 months, n=3 (38%) in Group 3 at 30.0 months, an n=3 (30%) in Group 4 at 32 months. No complications, wound infections or early reoperations occurred in any group; no patients required tracheostomy after phrenic nerve transfer.

CONCLUSION

Nerve grafting with nerve transfer demonstrated the greatest improvement in upper extremity function. Nerve grafting demonstrated improvement over neurolysis with or without nerve transfer, but less than nerve grafting with transfer. Patients required fewer tendon transfer surgeries after nerve grafting as compared to neurolysis; fewer still when nerve transfer techniques were employed. The use of regional nerves as a source of axons for transfer is efficacious with no demonstrated increase in morbidity.