Use of Neuromuscular Electrical Stimulation in the Treatment of Neonatal Brachial Plexus Palsy: A Literature Review

Kate Chang, MA, MS, Denise Justice, OTRL, Lynda J-S Yang, MD, PhD

MICHIGAN MEDICINE
UNIVERSITY OF MICHIGAN

BRACHIAL PLEXUS PROGRAM

BACKGROUND

Neuromuscular electrical stimulation (NMES) has been used in stroke, cerebral palsy, and spinal cord injury. NMES is also used to treat the peripheral nervous system disorder, Neonatal Brachial Plexus Palsy (NBPP). However, its effectiveness has not been established. Furthermore, no standardized protocol of NMES usage exists in the NBPP population.

We reviewed the current literature to determine whether the use of NMES in NBPP is warranted.

METHODS

- Review of English language articles published between January 1947 and March 2015 using MEDLINE, EMBASE, and SCOPUS.
- Keywords: “peripheral nerve OR brachial plexus AND stimulation AND neuromuscular OR muscle OR electrical”
- Excluded articles: reports on animals, cadavers, anesthetic techniques, intraoperative stimulation, TENS, radiology, or neurophysiology.
- Collected data included patient demographics, NMES equipment type / settings, and other concurrent treatments.
- Pre-treatment and post-treatment outcomes reported in the literature include Medical Research Council (MRC) muscle power and active range of motion (AROM).

RESULTS – NMES improves AROM

Muscle	# Pt	Pre-NMES AROM	Post-NMES AROM	# Pt	Pre-NMES MRC	Post-NMES MRC
Shoulder abduction	11	26°±28°	63°±45°	12	2	2
Shoulder flexion	2	150°±0°	180°±0°	2	1	4
Elbow flexion	9	10°±3°	51°±48°	11	2	2
Wrist extension	9	8°±3°	46°±50°	11	2	2

RESULTS - NMES use in NBPP is International

Author/Year	# Pt	Country	NBPP Lesion	Mean Age	NMES Equipment	Settings	Other Treatments
Adedeji 2009	2	Nigeria	C5-C6	3 weeks	Enraf-Nonius	8.5mA to 15 mA; 15 mins per muscle. 1,000 ms pulse duration and 300 ms pulse width.	Exercise, splint, massage; 2 sessions/week for 4 months
Berggren 2015	1	United States	C5-T1	2 weeks	Not reported	20 to 25 pps; 0.1 to 0.15 ms pulse duration.	Exercise, stretching, constraint-induced movement therapy.
Okafor et al., 2008	8	Nigeria	C5-C6	22 days	707 model	3 sessions/week for 6 weeks	No
Srilakshmi 2013	1	India	C5-C6	4.5 months	Not reported	Faradic and galvanic currents; 5 mins per muscle.	Avurvedic treatment; 3 sessions/28 days.

CONCLUSIONS

- Outcomes after NMES in NBPP vary widely.
- Use of NMES demonstrates some improvement in AROM.
- No agreement regarding NMES protocol exists.
- A Randomized Control Trial using standardized NMES protocol is indicated.

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