### The Use of Donor Activation as the Guiding Rehabilitation Strategy Following Nerve Transfer Surgery for AIN Palsy: a Case Report

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#### Objectives

There is a paucity of information in the literature regarding motor re-education protocols for patients undergoing nerve transfer surgery. A donor activation focused rehabilitation approach has not been well described. The nerve transfer surgery effectively changes the efferent source for the paralyzed (recipient) muscle. Using this approach cortical control is transferred to the donor muscle efferents. A program focused on donor activation establishes a new motor pattern to achieve cortical remapping following a nerve transfer. In the following, we present a case to illustrate the use of this therapeutic approach.

#### Case Description

A 50 year-old female presented with an isolated AIN palsy with the remaining median nerve function intact. Eight months post onset, with no sign of recovery by electro-diagnostic and clinical exams she underwent nerve transfer surgery (FDS branch of median to AIN nerve) to restore AIN function in the non-dominant left hand. To advance her grip strength during the nerve transfer recovery period a profundus tenodesis was also performed. Donor activation exercises were initiated at two months post-operative. The patient attended therapy sessions twice a month that initially included PROM, Active/Active-resisted FDS exercises and combined resisted “donor” muscle contractions with passive “recipient” muscle exercises. At three months, when the patient attained 1+/5 MMT muscle grade, the program was progressed to resisted donor muscle activation with AAROM to the recipient muscle, including “place and hold” exercises. As the strength of recipient muscles improved, the program was advanced accordingly.

#### Outcomes

At the 12-month follow-up visit, the patient demonstrated the ability to actively flex the thumb IP joint 30 degrees with simultaneous donor activation. At fifteen months post op patient demonstrated a 3+/5 MMT score at the FPL muscle and a 4-/5 at the FDP of the index and long fingers. By 17 months post-op a lateral pinch of 4 pounds was achieved without hyperextension of the thumb IP joint. Her grip strength advanced to 44 pounds or 79% of her dominant side. She demonstrated improved ability to use the left hand for functional tasks including pulling zippers and buttoning clothing.

#### Discussion

The use of a donor activation strategy for post nerve transfer rehabilitation was successful for providing functional gains in hand movement for this patient. This strategy can also be applied to any nerve transfer as a guiding model for motor re-education following a nerve transfer. This patient regained hand function, which allowed for increased functional use of the non-dominant hand within the first year post-operative. The timeline of this patient’s recovery may be aberrant due to peri-operative wound healing issues which delayed initiation of therapy and included a month long hold during the first year when the patient developed a delayed suture reaction. In spite of this the patient recovered AIN function. We believe this case clearly illustrates a therapy approach that can be successful even in a challenging clinical example.

#### References