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# Status of Injury Induced Hand Dominance Transfer in Patients with Global Brachial Plexopathy - A Comparison with Age Matched Normal

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## ABSTRACT

**Background:** Traumatic brachial plexus injury is a catastropic injury leading to functional impairment of upper limb. Injury to the dominant side is more devastating because the skills endowed to the dominant hand must be transferred to the non-dominant hand which is known as injury induced hand dominance transfer (I-IHDT). Hand grip strength, manual dexterity and handwriting skills form integral part of activities of daily living which must be trained for.
**Methodology:** Hand grip strength, manual dexterity and quality of writing of the unaffected side of 30 patients with global brachial plexopathy (Group A) was compared with the non-dominant side of 30 age matched healthy adults (Group B).
**Results:** Group A showed significantly higher values in the mean for hand grip strength. (Group A -13.47; Group B – 12.03; p- 0.0254).
Group A showed significantly lower values in the mean for manual dexterity. (Group A - 57.37, Group B -63.05; p-0.0070).
Group A showed no significant change for quality of handwriting using Handwriting Eligibility Scale. (Group A –16.00, Group B – 16.07; p - 0.7706).
Group A showed significantly lower no. of words written in 6 minutes compared to group B (Group A - 28.20, Group B - 46.40, P - <0.0001)
**Conclusion:** The present study concludes that the hand grip strength of the uninjured, non-dominant hand of brachial plexus injury patients was higher than grip strength of non-dominant hand of age matched healthy normals whereas the dexterity and handwriting scores were lower when compared to non-dominant side of age matched normals.

***KEY WORDS:*** Brachial plexus injury, injury induced hand dominance transfer, hand grip strength, dexterity, handwriting, functional training

## INTRODUCTION

"Brachial plexus is the complex network of nerves, which innervates the upper extremity". [(1).] Traumatic brachial plexus injury is a catastrophic injury leading to functional impairment of the upper limb. [(2)] Symptoms of brachial plexopathies include transient period of burning, stinging sensation, disabling neuropathic pain and loss of muscle power throughout the

involved upper limb. [3] Research has shown that among these young healthy adults particularly male patients (89%) are most commonly found and 50% of patients are between 19 and 34 years of age. [4] Dominant hand is found to be most commonly affected.

Global brachial plexus injury is the most challenging form of brachial plexopathy. "The treatment of global brachial plexus injury is a demanding field of hand and upper extremity from both surgical as well as rehabilitative perspective". [5]

According to a study done on global brachial plexus injury patients "the mean follow-up period was 4.59 years (range 3-9 years). The effective motor recovery rate was 54%, 86%, 46% and 43% respectively in supraspinatus, biceps, triceps and finger flexors." [6] It is, hence, inferred that a global brachial plexus injury is associated with a very long follow up duration and the functional outcomes of patient are not very satisfactory.

The most important goal after a global brachial plexus surgery and rehabilitation is making the patient functional to carry out his activities of daily living. However, owing to the prolonged recovery time the patient is unable to use his affected extremity in his daily activities. Most activities of daily living (ADL) are performed with both hands, with the dominant hand as the main performer and the non-dominant hand as the assistant. If normal bilateral hand function is impaired, patient should perform two-handed work with one hand. The functional state of "single handedness" can be transient. However, if the prognosis for functional recovery is poor, they will continue to last with one hand. This one-handed situation is more difficult when injury is to the dominant hand. This is because complex fine movement adjustments and skills need to be transferred to the non-dominant hand. This forced shift of dominance is termed as injury induced hand dominance transfer (I-IHDT). This conceptually defines the imposed transfer of lateralized skill proficiency to the previously nondominant limb. (7) Taking into consideration the poor functional outcome of global brachial plexus injury, this transfer of dominance becomes inevitable.

Hand grip strength and manual dexterity are some important components that form an integral part of our activities of daily living. Taking into consideration the affected age group, handwriting is a life learning skill. All three of these are required for the execution of functional activities.

Hand function is dependent on proper functioning of the intrinsic and extrinsic muscles of the hand. Elfant, in 1977, has defined manual dexterity as 'the ability to make skilful, controlled arm hand manipulations of objects". Loss of dexterity, whether as a result of an insult to the central or peripheral nervous system impairs the performance of a person with basic and advanced ADL. Hand dominance is also closely associated with, and is often defined by, the functional neuromotor task of handwriting. Because handwriting is considered to be the highest form of unilateral skill, it is an important component of injury induced hand dominance transfer. [8,9,10] Research suggests that handwriting is not an auto-emergent skill but rather one that needs to be dealt with intentionally. [11,12] Considering the age group that is most commonly affected, writing becomes a necessary activity for such patients.

Available rehabilitative protocols and literatures in brachial plexopathy focus mainly on management of affected extremity while the patient is just asked to incorporate the use of unaffected extremity in functional activities.[13,14] There are studies done on transfer of dominance in amputees, in military personnel with upper extremity injuries.[15] However, there is scarcity of literature on the assessment and training of injury induced hand dominance transfer in global brachial plexus injury patients.

The time required for this transfer of dominance to occur is not known and is an underexplored area in literature. Also, there

are conflicting evidences regarding the transfer occurring automatically or requiring practice. Hence, this study is intended to assess how efficiently the non-affected side (which was originally non-dominant side of patient till the time of injury) is functioning when compared with non-dominant side of healthy adults, within 1 year of injury.

## MATERIALS AND METHODS

A comparative study was done at Hand OPD of physiotherapy Department, Physiotherapy school and center Seth G.S. Medical college and KEM Hospital, Mumbai after receiving ethical clearance from the institute. It was conducted for a duration of one year. Total of 60 participants participated in the study and were conveniently divided into one of the two groups namely, Group A consisting the Brachial Plexus patients (30) and Group B consisting age matched Healthy Adults (30). Subjects were screened according to the inclusion and exclusion criteria and only those eligible were included in the study. The inclusion criteria was as follows: Patients with global brachial plexus injury on dominant side, both genders males and females, age group: 21-30 years of age, from 6 months to 1 year of injury, patients who have not resumed the job, patients who can read and write English/Hindi/Marathi, healthy adults with right dominance. Exclusion criteria for group A was as follows: Recent trauma or surgery to unaffected extremity of brachial plexus injury patients, any complaint of pain in the unaffected extremity, psychological conditions, bilateral brachial plexus injury patients. Exclusion criteria for group B was as follows: Any neurological conditions, musculoskeletal dysfunctions. Baseline assessment was done for both the groups. Grip strength, manual dexterity and handwriting was assessed for both the groups.

### STUDY PROCEDURE

1. **Measuring hand grip strength using Jamar hand dynamometer.** [16]

To assess hand grip strength, a Jamar hand dynamometer was used as recommended by the American Society for Surgery of the hand and the American Society of Hand Therapists. The American Society of hand therapists standardized arm position for hand strength testing was utilized. Three trials were given to each subject. The mean score among three trials was recorded for data calculations.

2. **Box and block test for manual hand dexterity:**[17,18]

The box and block test comprises of a wooden box (dimensions 53.7cm × 25.4cm × 8.5 cm) divided in two compartments by a partition and 150 blocks (2.5cm in size) placed lengthwise along the edge of a standard height table. The blocks were placed in the compartment of the test box on the side of the patient's hand to be tested. The individual was asked to move as many blocks as possible, one at a time, from one compartment to another for a period of 60 seconds. The patient was given the instructions that while carrying the blocks only one should be carried at a time, if more than one is carried at a time, it will not be considered. The fingertips should cross the partition. The blocks that drop or bounce out of the second compartment will be considered. Scoring: Patients were scored based on the number of blocks transferred from one compartment to another in 60 seconds. Higher scores are indicative of better manual dexterity.

**3. Handwriting legibility scale for assessing quality of writing and speed: (19)**

The handwriting legibility scale was used to assess the quality of writing and speed of writing. It contains 5 components, each of which was rated on a five-point scale (1-5), with higher scores indicating poorer performance. The score was calculated by summing the 5 component scores. An A4 size paper was given to the patient and the assessment was based on a piece of "free writing" produced by the patient. 6 minutes were given to the patient and no. of words written in these 6 minutes were counted.

## STATISTICAL ANALYSIS:

- Data for statistical analysis was entered using MS-excel version 2205. Statistical analysis was performed using Graph Pad Prism (version 9.4.0) software. 60 participants were included in the study, 30 in each group.
- In this study, baseline matching between two groups was done for hand grip strength, manual dexterity and handwriting (quality and quantity) by comparing mean values between the 2 groups: Group A consisting of Brachial plexus injury patients and Group B consisting of age matched, gender matched healthy adults.
- Shapiro-Wilk test was used to check normality of the data.
- Hand grip strength, No. of words written in 6 minutes (quantity of handwriting) did not pass the normality test. Hence, were compared using the non-parametric test, Mann-Whitney U test.
- Quality of handwriting was assessed using non-parametric test Mann-Whitney test.
- Dexterity passed the normality test hence, was compared using the parametric test, unpaired t test.
- Significance value was set at $p=\leq 0.05$. Median, IQR, 95% CI of median, minimum & maximum value were calculated and plotted using the bar diagram.

## RESULTS

- 60 patients participated in the study as two groups- Group A: included brachial plexus injury patients and Group B: included age matched healthy adults.
- Group A showed significantly higher values in the mean for hand grip strength. (Group A -13.47; Group B – 12.03; p- 0.0254).
- Group A showed significantly lower values in the mean for manual dexterity. (Group A -57.37, Group B -63.05; p- 0.0070).
- Group A showed no significant change for quality of handwriting using Handwriting Eligibility Scale. (Group A –16.00, Group B – 16.07; p - 0.7706).
- Group A showed significantly lower no. of words written in 6 minutes compared to group B (Group A - 28.20, Group B - 46.40, P - <0.0001

**Table 1: Comparison of hand grip strength between group A and group B using Mann-Whitney U test.**

| HAND GRIP STRENGTH (Kg) | GROUP A | GROUP B |
|---|---|---|
| Mean | 13.47 | 12.03 |
| SD | 2.28 | 1.77 |
| SEM | 0.4162 | 0.3235 |
| 95% CI | 12.61-14.32 | 11.37-12.69 |
| P Value | 0.0254 | |

**Inference:** The hand grip strength mean is significantly higher in brachial plexus injury patients as compared to age matched normals.

**Table 2: Comparison of manual dexterity between group A and group B using unpaired t-test.**

| MANUAL DEXTERITY | GROUP A | GROUP B |
|---|---|---|
| Mean | 57.37 | 63.05 |
| SD | 7.065 | 8.589 |
| SEM | 1.290 | 1.568 |
| 95% CI | 54.73-60.01 | 59.30-66.25 |
| P Value | 0.0070 | |

**Inference:** The manual dexterity mean is significantly lower as compared to age matched normals.

**Table 3: Comparison of quality of handwriting between group A and B using Mann-Whitney U test.**

| HANDWRITING (QUALITY) | GROUP A | GROUP B |
|---|---|---|
| Mean | 16.00 | 16.07 |
| SD | 3.591 | 3.676 |
| SEM | 0.6557 | 0.6711 |
| 95% CI | 14.66 – 17.34 | 14.69 – 17.44 |
| P Value | 0.7706 | |

**Inference:** There is no significant difference between quality of handwriting of uninjured, non-dominant side of brachial plexopathy patients when compared to non-dominant side of age matched normals.

**Table 4: Comparison of quantity of handwriting between group A and group B using Mann-Whitney U test.**

| HANDWRITING (QUANTITY) | GROUP A | GROUP B |
|---|---|---|
| Mean | 28.20 | 46.40 |
| SD | 11.88 | 15.58 |
| SEM | 2.169 | 2.844 |
| 95% CI | 23.76-32.64 | 40.58-52.22 |
| P Value | < 0.0001 | |

**Inference:** The number of words written in 6 minutes are significantly reduced than that of age matched, normals.

## DISCUSSION

Hand grip strength of the uninjured, nondominant side of brachial plexus injury patients is found to be increased when compared to strength of non-dominant side of normals. Hence, it can be inferred that there is transfer of dominance with respect to hand grip strength. In case of a pan brachial plexus injury especially in the initial 6 mts to 1 year when recovery has not yet occurred, the patient is compelled to use his uninjured, nondominant extremity into his activities of daily living as the dominant hand is still not functional in majority of patients. The nondominant limb now has to perform the activities that were previously done by the dominant extremity. This incorporation of the nondominant limb into various activities of daily living leads to certain changes occurring in the limb.

Hence, automatically the patient is undergoing functional training to gain strength. Recent literature favors the use of functional training to gain strength instead of the previously used conventional strengthening protocols. [20,21] Graef et al. in his study on stroke patients investigated the effects of functional training (using functional movements) and analytical strengthening (using repetitive movements) on activity level and muscular strength gain. He concluded that immediately after functional training, patients showed improvements in the activity levels. This improvement was also retained in follow-up. He has stated that current neurorehabilitation approaches encourage the use of functional training rather than the conventional strengthening protocols. [22] Similar results are seen in this study where the grip strength of nondominant side of bpi patients is more than that of normals. This change can be attributed to the incorporation of limb into daily activities.

The dexterity scores of group A i.e., brachial plexus injury patients were lower than those of non-dominant side of normals. Hence, it can be inferred that there was no transfer of dominance with respect to the skill of dexterity. Ramalho et al. through the sensory assessment of injured as well as uninjured upper limb of brachial plexus injury patients inferred that, the sensory thresholds of the uninjured side were also increased as compared to normal. This indicates sensory impairment in the uninjured side also. This is in agreement to the various deafferentation models published earlier stating similar sensory impairment on uninjured side in amputees, burn patients. This indicates that in brachial plexus injury patients, central modifications in the hemisphere contralateral to the uninjured limb occurs. (23). Johansson et al. stated that normal dexterity relies on complex motor loops, including the use of sensory information as a feedforward and feedback set for the mechanism. For example, when grabbing an object, anticipatory control is used to predict the required motor commands based on the physical properties of the object, such as weight etc. (24) Thus, from the previous studies it is inferred that there is affection not only on the involved side but also on the uninjured side especially in the sensory function (25). Dexterity relies on the sensory input; the signals are then sent to cortex via afferent fibres followed by motor action. Thus, any disruption in this neuronal circuit can affect dexterity (26,27). Since, sensory affection is seen on the uninjured side, the sensory input provided is not proper which in turn leads to affection of dexterity. Also, affection is more profound in case of dominant side brachial plexus injury. Since the study population chosen is dominant side brachial plexus injury, affection of dexterity is found to be significantly higher when compared to normals.

In this study, handwriting was assessed for quality as well as quantity. It is inferred that there was no significant difference between the quality of writing of uninjured, non-dominant side of brachial plexus injury patients when compared to non-dominant limb of normal. However, the quantity i.e., the number of words written in six minutes by brachial plexopathy patients were significantly less than those written by normal with their non-dominant hand. This indicates that there was no transfer of dominance with respect to handwriting. Handwriting is said to be a skill that must be dealt with intentionally and is not auto emergent [28,29,30]. The patient population that was considered for the study were not trained to write with their non dominant hand. There are evidences in literature that indicate the influence of training on handwriting performance. Yancosek et al. in his study on participants with functional loss of dominant extremity assessed for kinematics of handwriting and legibility of the non-dominant hand. He assessed two samples taken 6 weeks apart. The participants were not trained to write with their non dominant hand. The results showed no difference in test-retest samples.

However, there was significant inter-subject variability. One participant reported that he had not written anything since his amputation that took place 7 years earlier whereas another participant reported that she has been writing every day since her amputation that occurred 6 years back and showed much higher writing speed than the rest of the participants. He thus concluded that handwriting not being an auto emergent skill needs practice and cannot be just learnt spontaneously. [7] Also, handwriting is a precision activity requiring a proper balance of sensory and motor responses. As discussed earlier sensory affection is also seen on the uninjured side of a brachial plexus injury patient which could in turn cause affection of handwriting performance. Thus, these are predominantly the causes affecting handwriting performance seen in this study. It also underlines the importance of training handwriting in this study population in the early stages of rehabilitation.

## CONCLUSION

The present study concludes that the hand grip strength of the uninjured, non-dominant hand of brachial plexus injury patients was higher than grip strength of non-dominant hand of age matched healthy normals whereas the dexterity and handwriting scores of the uninjured, non-dominant extremity were lower when compared to non-dominant side of age matched normals. Hence, it is inferred that the dominance transfer has taken place with respect to hand grip strength which is a gross motor activity. Whereas for the fine motor activities i.e. dexterity and handwriting, dominance transfer has not occurred.

### Clinical Implications

The focus of rehabilitation in brachial plexus injury patients is always on motor recovery of the injured side. However, the uninjured side may be neglected during rehabilitation and proper training for the uninjured side may not be included in the rehab. As inferred from this study, only hand grip strength improvement has occurred with inculcation of the uninjured side in daily activities whereas dexterity and handwriting scores are found to be reduced when compared to non-dominant side of normals. Also, there are evidences in literature indicating sensory affection of the uninjured side. The impact of injury on daily living is greater when affected side is the dominant side.

Hence, the following points can be considered and inculcated in rehabilitation protocols when treating a brachial plexus injury patient:

- Council the patient regarding the prolonged recovery time in a brachial plexus injury and make the patient understand the importance of working on the uninjured limb as well.
- A protocol for training the uninjured limb, especially when it is the non-dominant limb can be formulated and incorporated in the rehabilitation program.
- The protocol could be designed in such a way that gross as well as fine motor activities are included in it. Considering young population who is most commonly affected, handwriting training with the non-dominant should be a crucial part of the protocol.
- Inclusion of sensory integration training of the uninjured limb.

### *Declaration by Authors*

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## REFERENCES

1. Vasileios I. Sakellariou, Nikolaos K. Badilas, George A. Mazis. Brachial Plexus Injuries in Adults:Evaluation and Diagnostic Approach ISRN Orthopedics Volume 2014, Article ID 726103, 9 pages.
2. Shelley Noland; Allen Bishop; Robert Spinner .et al Journal of the American Academy of Orthopaedic Surgeons. 27(19):705-716, OCTOBER 1, 2019

3. C. Buz Swanik,Tim J. Henry, Scott M. Lephart Chronic Brachial Plexopathies and Upper Extremity Proprioception and Strength Journal of Athletic Training Volume 31 Number 2 e June 1996.
4. N. Smania, G. Berto, E. La Marchina, C. Melotto, A. Midira, L. Roncari, A. Zenorini, P. Ianes, A. Picelli, A. Waldner, S. Faccioli, M. Gandolfi .et al Rehabilitation of brachial plexus injury in adults and children. Eur J Phys Rehabil Med 2012; 48:483-506
5. Moghekar, Ajit R, Abhay R, Karti, Necdet, Chaudhary, Vinay J of Clinical Neuromuscular Disease Sept 2007-vol 9-issue1-p-243-247
6. Youhou Liu, Jie Lao, Kaiming,Gao, Yudong Gu, Xin Zhao Functional outcome of the nerve transfers for traumatic global brachial plexus injury doi.org/10.1016/j.injury.2012.02.006
7. Kathleen E. Yancosek, David R. Mullineaux. Stability of handwriting performance following injury-induced hand dominance transfer in adults: A pilot study. Journal of rehabilitation Research and Development Volume 48 number 1, 2011, pages 59-68
8. Térémetz M, Colle F, Hamdoun S, Maier MA, Lindberg PG. A novel, ethod for the quantification of key components of manual dexterity after stroke. Journal of neuroengineering and rehabilitation. 2015 Dec 1;12(1):64.
9. Carmeli E., Patish H, Coleman R The aging hand. Journal of gerontology series A: Biological sciences and medical sciences 2003 Feb 1; 58(2):M46-52
10. Luigi Tesio, Anna Simone, Guiliano Zebellin, Viviana Rota, Calogera Malfitano and Laura Perucca Bimanual dexterity assessment: validation of a revised form of the turning subtest from the Minnesota Dexterity test. Int. Journal of Rehabilitation Research 2016,39:57-62
11. 10 Jones D, Christensen CA. Relationship between automaticity in handwriting and students' ability to generate written text. J Educ Psychol. 1999; 91:44–49. DOI:10.1037/0022-0663.91.1.44 27.
12. Graham S. Issues in handwriting instruction. Focus on exceptional children. 1992;25(2):1–14.
13. Chhaya Verma, Raveena Kini, Sujata Yardi, Vinita Puri, Jyotsna Thosar. Post nerve transfer neuroplastic motor retraining program in adults with traumatic brachial plexus injury: A physiotherapist's perspective. Journal of Society of Indian Physiotherapists, August, 2019;3(2):53-57
14. Kathleen E Yancosek, William J Calderhead. Efficacy of handwriting for heroes, a novel hand dominance transfer intervention. Hand therapy 17(1), 15-24,2012
15. Xiaoli Guo, Yuanyunan Lyu, Robin Bekrater-Bodmann, Herta Flor, Shanbog Tong. Handedness change after dominant side amputation: Evaluation from a hand laterality judgement task. Annu Int Conf IEEE Eng Med Biol Soc. 2015 Aug; 2015:8002-5. doi: 10.1109/EMBC.2015.7320249.
16. George F. Hamilton, C. McDonald, T.C. Chenier Measurement of grip strength: validity and reliability of sphygmomanometer and jamar hand dynamometer.
17. Desrosiers J, Bravo G. et al "validation of box and block test as a measure of dexterity of the elderly people: Reliability, validity, norms studies" Arch Phys Med Rehabil 1994,75:751-755
18. Mathiowetz, V.G. Volland et al (1985) "adult norms for box and block test of manual dexterity" Am J Occup Ther 39(3160243):386-391
19. Anna L Barnett, Mellisa Prunty, Sara Rosenblun Development of handwriting legibility scale: A preliminary examination of the realiability and validity Research in developmental disabilities 72,240-247;2018
20. Stein J, Krebs HI, Frontera WR, Fasoli SE, Hughes R, Hogan N: Comparison of two techniques of robot-aided upper limb exercise training after stroke. Am J Phys Med Rehabil 2004; 83:720–728.
21. Winstein CJ, Rose DK, Tan SM, Lewthwaite R, Chui HC, Azen SP. A randomized controlled comparison of upper-extremity rehabilitation strategies in acute stroke: a pilot study of immediate and long-term outcomes. Arch Phys Med Rehabil 2004; 85:620–8.
22. Patrícia Graef, Stella M. Michaelsen, Maria L. R. Dadalt5, Daiana A. M. S. Rodrigues5, Franciele Pereira, Aline S. Pagnussat. Effects of functional and analytical strength training on upper-extremity activity after stroke: a randomized controlled trial Braz J Phys Ther. 2016 Nov-Dec; 20(6):543-552

23. Ramalho, Bia Lima, et al. "Unilateral brachial plexus lesion impairs bilateral touch threshold." Frontiers in neurology 10 (2019): 872.
24. Johansson, R. S., & Cole, K. J. (1992) Sensory-motor coordination during grasping and manipulative actions. Current Opinion in Neurobiology, 2, 815-823.
25. Duque, J., Thonnard, J. L., Vandermeeren, Y., Sėbire, G., Cosnard, G., & Olivier, E. (2003) Correlation between impaired dexterity and corticospinal tract dysgenesis in congenital hemiplegia. *Brain*, 126, 732-747.
26. Felicity Bitter, Susan Hillier, And Lauren Civetta. Change in dexterity with sensory awareness training: A randomised controlled trial. Perceptual and Motor Skills, 2011, 112, 3, 783-798.
27. Konopka, Karl-Heinz, et al. "Bilateral sensory abnormalities in patients with unilateral neuropathic pain; a quantitative sensory testing (QST) study." PloS one 7.5 (2012): e37524.
28. Clare Porac Terri Buller Overt Attempts to Change Hand Preference: A Study of Group and Individual Characteristics. Canadian Journal of Psychology, 1990, 44(4), 512-521.
29. Eggers IM, Mennen U. The EFFUL system (Evaluation of Function in the Flail Upper Limb) system. A ranking score system to measure improvement achieved by surgical reconstruction and rehabilitation. J Hand Surg Br. 1997; 22(3):388–94.
30. Sandve H, Lorås H, Pedersen AV. Is it possible to change handedness after only a short period of practice? Effects of 15 days of intensive practice on left-hand writing in strong right-handers. Laterality. 2019 Jul;24(4):432-449. doi: 10.1080/1357650X.2018.1534856.

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