



H Reflex in Traumatic Brachial Plexus Injury

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ABSTRACT

Introduction: Brachial plexus injuries are devastating event in the prime of life. This study included 30 patients with traumatic brachial plexus injury of more than 3 months duration of either sex.

Aims: To establish the H reflex in upper limb and study the pattern in brachial plexus injury.

Methods: The flexor carpi radialis muscle H reflex was evaluated on both the affected and unaffected limbs. The test was done in a single sitting. M latency, H latency and H-M latency were examined.

Results: The H reflex was significantly decreased in all patients with brachial plexus injury. The latencies were increased. All the patients were having complaint of inability to lift the affected limb.

Conclusion: The H reflex amplitude is decreased in all the patients on affected limb.

Key words: H reflex, Brachial plexus, traumatic injury, upper limb, flexor carpi radialis.

INTRODUCTION

The brachial plexus is a network of intersecting nerve fibres, running from the spine, formed by the ventral rami of the lower four cervical and first thoracic nerve roots (C5-C8, T1). The nerves emerging from the plexus gives motor and sensory supply to the limb and pectoral muscles. [1] The injury to brachial plexus is not uncommon. [2] Motorcycle misadventures, warfare injuries, contact sports and birth trauma are some of the leading causes of traumatic brachial plexus injury. Viral infections, tumours, surgical misadventures, radiation fibrosis are some of the non traumatic factors associated with brachial plexopathy. [3] Hoffman reflex (H reflex) is

the reflex produced by afferent conduction in large afferent fibers and by efferent conduction in alpha motor neurons. It is a widely used clinical tool in assessment of neuromuscular disorder. [4] It has been recorded in more than 20 muscles throughout the body including muscles of the hand, arm, leg, foot and jaw. It is often been described as the electrical analogue of the stretch reflex. [5] Much of the work with H reflex has been done on soleus muscle i.e. sacral plexus lesions. [6] The work on brachial plexus injuries is very dismal. So, the current study aims at establishing the pattern of H reflex in traumatic brachial plexus injuries.

MATERIALS AND METHODS

30 patients with history of trauma with clinical and radiological diagnosis of brachial plexus injury for at least 3 months of either sex irrespective of age were selected. They were informed about the procedure in detail in their own language and informed consent was taken in a fixed performa. They were encouraged to ask questions regarding procedure. They were screened out for the presence of any other metabolic or endocrine factors causing plexopathy. The ethical clearance was taken from the institute ethical committee. The affected side was taken as Group I and the healthy side was taken as Group II.

The detailed history was taken from each for the pattern of injuries, the mode of injury, associated lesions and the course of treatment. H reflex was conducted on RMS EMG EP Mark II machine manufactured by Recorders and Medicare Systems, Chandigarh, India in an air conditioned room with the temperature 23 °C to 34 °C inside the Faraday's cage.

The patient was asked to lie down comfortably and his arm supported at an arm rest in supine position at an angle of 45° relative to the trunk. Patient was asked to close his/her eyes and keep the arm in fully relaxed position. The junction of upper one third and lower two thirds of the distance between the medial epicondyle and the radial styloid i.e. the belly of Flexor Carpi Radialis was cleaned with spirit swab and allowed to dry. The Ag/AgCl surface recording electrode was put proximally and the reference electrode at the radial styloid and secured with adhesive tapes. The grounding electrode was secured with adhesive tapes between the stimulating and recording electrodes. H reflex was evoked on both the sides with the cathode placed in the bicipital groove just above the cubital crease over the median nerve. [7-9]

The stimulating cathode was proximal to avoid anodal block. The same

procedure was done on the non affected limb. The data generated was entered in the given proforma.

Stimulation protocol: The nerve was stimulated once every 15 seconds beginning at intensity below the H reflex threshold and increased until the maximum M response was reached.

Stimulus pulses of longer duration (1 ms) are used to preferentially activate large sensory fibers. Stimulus frequency kept at 0.2 Hz or less to allow full recovery of the H reflex from a prior stimulus. A series of responses obtained starting with submaximal stimuli increasing to supramaximal stimulation. Unpaired t- test was applied to the test result data.

RESULTS

The FCR H reflex was successfully evoked in healthy non affected side but was absent on affected side in most patients. 86.66% (26) patients had either reduced or absent H reflex on affected side. Only 13.33% (4) patients have near normal H reflex on affected side. Out of 11 patients with absent H reflex on affected side 10 (91.91) were males and 1 (9.09%) was female. Out of 15 cases with reduced amplitude of H reflex on affected side 14 (93.33%) were males and 1 (6.66%) was female and out of 4 normal H reflex on affected side 3 (75%) were males and 1 (25%) female.

The mean value of H reflex amplitude for group 1 was 0.7 ± 0.89 mV and for group 2 was 2.48 ± 1.51 mV ($p < 0.0001$).

Table 1. Characteristics of H reflex

H reflex	Numbers	Sex
Absent	11	Male - 10 Female - 1
Reduced	15	Male - 14 Female - 1
Normal	4	Male - 3 Female - 1

Table 2. Comparison of H reflex amplitude between Group I & Group II

Parameters	Group I (affected side)	Group II (healthy side)
n	30	30
Mean (mV)	0.7	2.48
SD	0.89	1.51
P value	<0.0001	

Table 3. Distribution of H reflex amplitude between Group I & Group II

H amplitude (mV)	Group I(affected side)	Group II(healthy side)
Absent	11	0
0-1	8	3
1.0-2.0	9	11
2.0-3.0	1	8
3.0-4.0	1	4
4.0-5.0	0	3
5.0-6.0	0	2
6.0-7.0	0	1

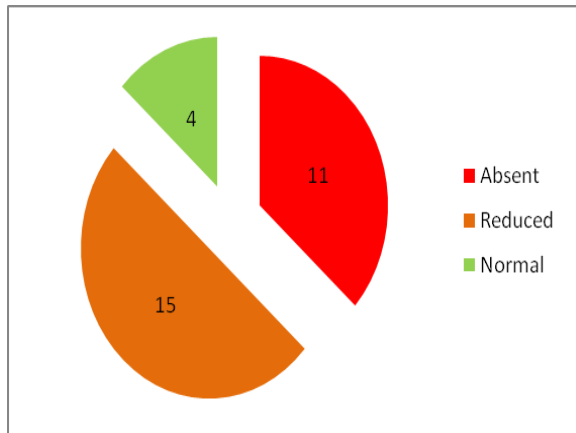


Fig 1. Characteristics of H reflex

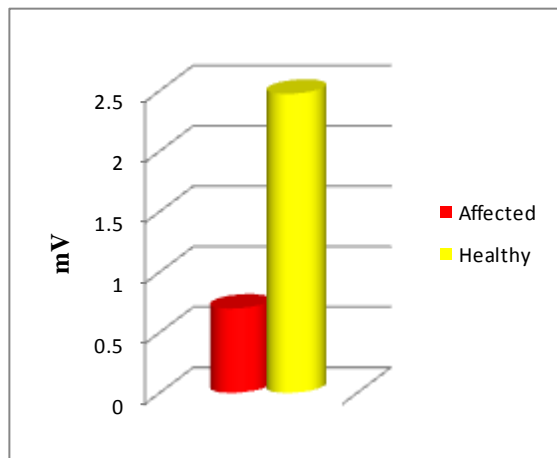


Fig 2. H reflex amplitude

The distribution of H amplitude among patients compared to their normal side showed H reflex was absent in 11

patients and it was less than 4 mV in all cases on affected side. Eight patients in group I had amplitude of H reflex between 0 to 1mV, 9 in the range of 1 to 2 mV and one each in 2 to 3 mV and 3 to 4 mV. In healthy limb most cases had H amplitude in the range of 1-3 mV. No case had absent H reflex in group II and 3 had in 0 to 1 mV range. 11 patients were having amplitude between 1 to 2 mV. Eight cases had amplitude in range 2-3 mV and 4 in range 3-4 mV. Three cases had it in range 4-5mV and 2 between 5-6mV. Only one case had more than 6 mV and no one had absent H reflex on healthy side.

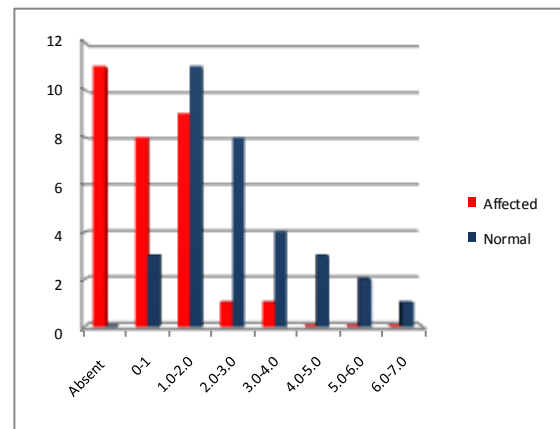


Fig 3. Distribution of H amplitude

DISCUSSION

Brachial plexus lesions are commonly seen in motorcycle accidents and this is probably due to tendency of fall on shoulder. Since males drive motorcycles more commonly, they compose the larger group of affected patients. This also reflects the region's motor vehicle utility pattern. Brachial plexus lesion usually leaves the patients with permanent disability. [10-13] Brachial plexus injury causes disruption of nerve fibers. H reflex is affected by disruption of either of afferent or efferent arm of the reflex arc. [7,14] A decrease in amplitude is consistent with disruption of reflex arc i.e. severity of lesion. A decrease in amplitude is associated with increase in

latency which is both in consistence with the findings of the study. ^[15,16] Careful observation with change in stimulation level can also determine the point of disruption. Since the data is scarce in upper limb we have established the normal values for various parameters of H reflex in Indian population. Though the sample is just 30 patients, further studies are required.

CONCLUSION

The amplitude of H reflex is a better parameter of measuring the severity of lesion and it is decreased in brachial plexus injury.

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