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RESEARCH ARTICLE

The Role of H-reflex latency in Assessment of Radiculopathy in Patients with Chronic Low Back Pain

Nabiel Abdel Hakeem Metwally, Hashem A. H.

Assistant Professor& Head of neurology Department, Faculty of Medicine, Al-Azhar University- Assuit,
Lecturer of neurology, neurology department, Al-Azhar university- Assiut.

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Corresponding Author

Nabiel Abdel Hakeem Metwally

Abstract

The role of neurophysiology in the assessment of peripheral nerve disorders is long standing well known, we need to evaluate the role of specific tests in the assessment of proximal nerve segments in comparison to a well established diagnostic tests as MRI. The purpose of this study is to assess the role of H-reflex latency in evaluation of radiculopathy in patients with chronic low back pain in comparison with clinical and radiological findings. Subject and method: A fifty patient was enrolled in this study including ten patients without root pain (group I) and forty patients with root pain (group II), subjected to clinical examination, laboratory studies, H- reflex study and lumbosacral MRI. Results: a statistically significant more prolonged H-latency in group II than group I, significant positive correlation of H-latency with height, age, duration, presence of sensory abnormalities, radiculopathy and MRI findings. Conclusion: H-latency is an important method in evaluation of radiculopathy in patients with chronic low back pain.

Introduction

The role of neurophysiology studies including late response (F and H response) in the assessment of patients with proximal root disorders are well known decades ago [1],

Most authors consider, pain to be "chronic" when it last for three months or more. However, some authors consider low back pain as chronic when it lasts for seven weeks or more, while others require duration of six months or more [2] .

Overweight has a significant association with the lumbosacral radicular pain [3]. The results of certain case-control studies have revealed a positive association between increased (body mass index) BMI and lumbar disc herniation among men and women [4] .

Lumbar disc herniation is an important cause of low back pain and lumbosacral radicular pain [5] . Fortunately, in as many as 90 percent of patients, acute low back pain resolves within six weeks regardless of treatment methods and only 5 to 10 percent of cases requiring surgery [6] .

Radiological and electrophysiological evaluation can't exactly provide the source of pain responsible for patient's symptoms in most cases [7].

There are other causes of radiculopathy beside nerve root compression and MRI would not be helpful in the diagnosis of these types of radiculopathy [8].The H-reflex is a useful electrophysiological procedure for evaluating the nerve conduction through the entire length of the afferent and efferent pathways, especially at the proximal segment of the peripheral nerve, which is inaccessible by routine surface stimulating and recording techniques and also suitable for evaluation of the potential entrapment of the S1 nerve root [9].

In studying S1 radiculopathy, prolonged onset latency and/or absence of the H-reflex on the affected side are the most commonly used measures of the H-reflex [10]. H-reflex is found to correlate highly with both age and leg length [11].

In this study, the role of H-latency well evaluated in assessment of patients with chronic LBP, through its relation to clinical and radiological findings.

MATERIALS AND METHODS

Participants:

This is a case study that performed at period from March 2013 to august 2014. Patients were selected with conventional method from patients referred to the electrodiagnostic unit, neurology department, faculty of medicine, AL Azhar University Hospital, Assiut branch, Egypt. This study was carried out on fifty patients with history of back pain more than 3 months from both sex (24men, and 26 women) participated in this study with an age range of 20-53 years, including 10 patients with no history of root pain and 40 patients with history of root pain. All participants were informed about the tests, and the study was approved by faculty of medicine, AL Azhar University Hospital. exclusion criteria were; those with acute onset back pain or manifested with low back pain below 3 months duration, significant trauma or surgical operation at lumbosacral region, those presented with neuropathy due to metabolic cause or history of drug abuse.

Method:

All participants were underwent a complete medical history, clinical examination and Laboratory investigations including: CBC, ESR, CRP, Serum Ca, Random blood sugar, Serum Albumin, bilirubin, ALT, AST, alkaline phosphates, Serum createnine, Blood urea, Complete urine analysis and MRI lumbosacral spine was done. The H-reflex was tested in room temperature with the subject lying prone (figure 1), when the stresses on the spine are minimal and their skin warmed to 32°C if cold. The cathode is placed at the mid-popliteal crease with the anode distal. The H-reflex was recorded using a gain of 200-500 micro volt Sensitivity—500 μv/division, Low frequency filter 2–3 kHz, High frequency filter 10 kHz, Sweep speed 10 msec/division, Stimulus duration 1.0 msec. H-reflex test was performed with Nihon Kohden corporation Model: MEB2003k, Serial no 00051, Japan 2012.

Data analysis:

Data were expressed as means ± SD (range) unless otherwise stated, Calculations were done with the statistical package of SPSS for windows, version 17.0 (SPSS inc., Chicago, IL, USA). $P \leq 0.05$ was set as significant, $p<0.001$ was set as highly significant, $p>0.05$ was set as non-significant. R value that was between 0.1–0.3 indicate mild correlation 0.3- 0.5 indicate moderate correlation, More than 0.5 indicate high correlation and -Ve result mean negative correlation.

RESULTS:

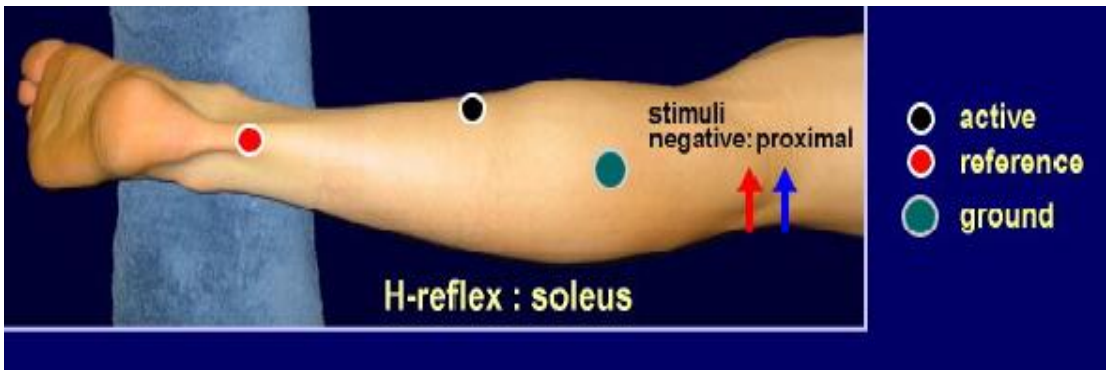

Figure (1): H-reflex electrode placement (Brinkworth, et al 2007).

The characteristics of patients:

This study was carried out on fifty patients with history of back pain more than 3 months from both sex (24 men, and 26 women) participated in this study with an age range of 20-53 years, including (group I), 10 patients (6 females and 4 males), with no history of root pain, and (group II) 40 (20 female and 20 male) patients with history of root pain, clinical characters of both groups including, main ±SD, height (171.2 ± 7.829, 172.2 ± 6.794 cm), age (44.4 ± 9.143, 43.4± 9.831 year), BMI (31.032±4.753, 29.331± 5.974 kg/m^2) and disease duration (22.600±15.749, 23.725± 19.084 month) respectively.

The following table (1) showed, significantly (P: 0.001) prolonged H-latency in group II than in group I.

Table (1): Comparison between group I and group II:

	Group I	Group II	P value
H-latency (msec)	23.801 ± 2.453	35.841 ±14.459	<0.001*

The following table (2) showed significant positive correlation between age and H-latency in group I and non-significant positive correlation with height, BMI and duration of disease (P: 0.398, 0.726 and 0.521) respectively, as regard group II, there were a significant positive correlation of H-reflex latency with height and duration of disease (P: 0.007 and 0.054) respectively, and non-significant positive correlation with age and BMI (P: 0.124 and 0.654) respectively.

Table (2): Correlation between H-reflex latency with height, age, BMI and disease duration in group I and II:

H latency(msec)	Clinical	Main± SD	R;	P value
23.801 ± 2.453 (group I)	Height	171.2 ± 7.829	0.200	0.398
	Age	44.4 ± 9.143	0.667	0.001
	BMI	29.331± 5.974	0.084	0.726
	Duration (months)	22.600±15.749	0.153	0.521
35.841 ±14.459 (group II)	Height (cm)	170 ± 6.228	0.342	0.007
	Age (years)	43.4± 9.831	0.198	0.124
	BMI (kg/m^2)	31.032±4.753	0.058	0.654
	Duration (months)	23.725± 19.084	0.246	0.054

The following table (3) showed a significantly prolonged H-latency in patients with radiculopathy, sensory deficit and MRI findings than those without, (P: 0.000) and statistically non significant (P: 0.307) in patients with or without motor deficit.

Table (3): relation of H-latency to clinical and MRI findings:

Clinical	Patient type	H-latency (msec)	P value
Radiculopathy	+ve (N: 40)	35.971±5.336	0.000
	-ve (N: 10)	29.129±1.305	
Motor deficit	+ve (N: 20)	34.645 ±3.271	0.307
	-ve (N: 30)	30.731±4.953	
Sensory deficit	+ve (N: 30)	36.173±3.921	0.000
	-ve (N: 20)	28.452±2.172	
MRI findings	+ve (N: 39)	34.645±4.587	0.000
	- ve (N: 11)	27.366±1.936	

Discussion:

The findings of the present study are generally agree with the results of many previous studies, significant (P: 0.007) positive correlation was found between H- latency and height of patients, that is in agreement with many studies [12-19] they found significant positive correlation between H-latency and height, the height or limb length considered as the most important physiological variable in H- latency, while our finding disagree with Ghugare, et al [20] and Balaji, et al [21] they found that, no significant correlation between H-latency and height.

In this study, a significant positive correlation between H-latency and age of patients was found, this result was in agreement with Ghugare, et al [20], and disagree with Timothy [22] and Alrowayeh & Sabbahi [23] they found, no significant relation of H-latency and age,

As regard correlation of H-latency with BMI of patients, in the present study there was non significant relation, this result is agree with Gilliatt [24], Ghugare, et al [20] and Balaji [21], they found same results, and disagree with Poonam, et al [18] who found significant positive relation between H-latency and weight of patients.

In this study there was a significant positive correlation of H-latency and disease duration, this is in agreement with Hao-Hsuan [25] and Alrowayeh & Sabbahi [23], they found significant positive correlation of H-latency and disease duration.

In this study we found that, H-latency was significantly prolonged in patients complaining from root pain than those non complaining, this result agree with Riccardo et al [15], Alrowayeh & Sabbahi [23] and Al-Jabr [26] they found same result.

Also in this study, we found that, non-significant relation between motor deficit and H-latency, this was in disagreement with Haroun et al [27] and Alrowayeh, & Sabbahi [23] they found that, H-latency was significantly prolonged in all patients with motor deficit, and in partial disagreement with Ball [28] who observed that prolongation or absence of H-reflex correlates well with a diminished or absence of ankle reflex in radicular disease.

Finally, In this study, we found that, the H-latency was significantly prolonged in patients with MRI findings than in these with normal imaging, this result was in agreement with Barr [29] and Al-Jabr [26], they found a good correlation between MRI findings and h-latency and was in partial agreement with Harry et al [30] who found significant negative correlation between spinal canal diameter and H-latency.

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