

Case Report

Evidence based Physiotherapy Management of a Cervical Radiculopathy Patient by using Clinical Reasoning Process

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Abstract

Introduction: Neck pain is one of the most common musculoskeletal disorder in the general population, second only to low back pain. Cervical radiculopathy is a dysfunction of a nerve root in the cervical spine resulting in producing radicular symptom such as pain, paresthesia, weakness, numbness in the upper extremity.

Case Report: The aim of this study is evidence-

based physiotherapy management of a single case of cervical radiculopathy. This single case was solved by using hypothetico deductive reasoning.

Result: After 6th week of intervention improvement was, found in pain reduction both in resting and during movement and improve range of motion. In addition, disability status also progressed from 60% to 20% and now patient can participate daily activities.

Conclusion: Clinical reasoning is the foundation in our clinical practice. McKenzie MDT for cervical spine, neural mobilization, manual cervical traction along with cervical stabilization exercise was effective for cervical radiculopathy patient.

Keywords: Hypothetico Deductive Reasoning; Cervical Radiculopathy; Neural Mobilization; Neck Disability Index

Abbreviations: CR: Clinical reasoning; HDR: Hypothetico-deductive reasoning; ICF: International classification of functioning, disability and health; MCT: Manual cervical traction; MMT: Manual muscle testing; NMCT: Neural mobilization with manual cervical traction; NDI: Neck disability index; RCT: Randomized clinical trial, ROM: Range of motion; ULNT: Upper limb neural tension test; VAS: Visual analogue scale; BHPI: Bangladesh Health Professions Institute

1. Introduction

Neck pain is one of the most common musculoskeletal disorder in the general population, second only to low back pain [1]. It is estimated that 30-50% of the population affected in every year & up to almost two of every three persons will experience neck pain at a certain time during their life time. Approximately 50-80% of individual with neck pain do not experience complete recovery of symptom and many of them go on to experience chronic neck pain [2, 3]. Cervical pain or neck pain with radiculopathy is a common presentation in our daily practice. Cervical radiculopathy is a dysfunction of a nerve root in the cervical spine resulting in producing radicular symptom such as pain, paresthesia, weakness, numbness in the upper extremity. Annual incidence has

been reported to be 107.3 per 100,000 for men and 63.5 per 100,000 for women affected with cervical radiculopathy [4]. The most common causes of cervical radiculopathy are cervical disc lesions and osteophyte encroachment, which results in nerve root or spinal nerve impingement or inflammation. As a result, produces radicular symptom in the ipsilateral extremity according to the affected nerve root [5]. The most common level of root compression is C7 (reported percentages 46.3–69%), followed by C6 (19-17.6%); compression of roots C5 (2–6.6%) and C8 (10-6.2%) are less frequent. One possible explanation is that intervertebral foramina are largest in the upper cervical region and progressively decrease in size in the middle and lower cervical areas, with an exception of the C7-T1 foramen (C8) [6].

Radiculopathy is differentiated from radicular pain, where radiculopathy is a neurological state in which conduction is limited or blocked along a spinal nerve or its [7]. When sensory fibers are blocked, numbness is the presentation to dermatomal distribution and when motor fibers are blocked, weakness follow myotomal pattern [8]. However, radiculopathy is not defined by pain rather than is defined by objective neurological signs. Although radiculopathy and radicular commonly occur together, radiculopathy can occur in the absence of pain, and radicular pain can occur in the absence of radiculopathy. Radicular pain is usually caused by compression of the nerve root due to cervical disc herniation or degenerative spondylotic changes, but radicular symptoms can also occur without evident compression, for instance, because of inflammation of the nerve [9].

Clinical reasoning is fundamental to physical therapist's practice. Clinical reasoning strategy play vital

role in diagnosis and management process of clients [10]. One well-known clinical reasoning approach is hypothetico-deductive reasoning process where generating the multiple hypothesis based on cue or information acquisition and testing these hypothesis steps by steps. Hypothesis generation and testing involves both inductive reasoning where moving from a set of specific observation to a generalization to generate hypothesis and slower, detailed deductive reasoning (moving from a generalization to a conclusion in relation to a specific case) to test hypothesis [11, 12].

1.1 Aim

The aim of this study is evidence-based physiotherapy management of a single case of cervical radiculopathy patient by using clinical reasoning process.

2. Case Report

Mrs “X” is 42 years old housewife suffering from neck pain with radicular symptom for about 3-3.5 months. Initially ignored her pain & gradually increase pain and radiated below elbow at the right upper limb. Also, face difficulties in her daily activities such as cooking, clothes washing, watching television etc. She consulted with general practitioner and take medication for some weeks. His neighbor advised him to consult physiotherapist in Centre for the Rehabilitation of the Paralyzed (CRP).

2.1 Baseline assessment

Neck pain is one of the leading causes of disability in the globe. A person with any form of disability to manage is a multi-dimensional and comprehensive approach and ICF (International classification of Functioning, Disability and Health) encounters the

requirement of understanding disability state for make certain person with disability with a better quality of life [13]. As impairments in body structure and functions, patient came to me complained of intermittent severe radiating pain and mild numbness at her right upper limb for about 3.5 months that day by day increases. She also noticed that her pain as like as electric shock which make his life untearable. On assessment, her pain at the right side of the neck and severe radiating at the lateral aspect of the forearm and intermittent mild numbness at the thumb and index finger. According to VAS scale resting was 8 out of 10 and mild decrease range of motion of cervical right side rotation, side bending and flexion. There is no muscle wasting as well as reflex also normal. The activity limitation include pain aggravated by household activities such as washing clothes, cooking and watching TV programme. She also faced participation restriction as like social gathering, family programme. Her environmental factor was poor ergonomics set up of kitchen, place of TV and her daily activities. Her only son who studying in Chittagong Cadet College and can't meet with her regularly. In addition, her husband was not interested to come with him in physiotherapy center also felt disturb due to long time of pain. All of these difficulties and situation make him depressed, worried and less confidence. I found her neck disability index (NDI) was 41%, which indicates severe disability.

2.2 Flags

During assessment found some factors which may obstacle the recovery and also helps in intervention.

2.3 Hypothetico deductive reasoning

As this was a complex case to detect initially I carried

out diagnosis and management plan step by step. Even though I have propositional knowledge but there is limited non-propositional knowledge about this case

2.3.1 Cue acquisition: Initially I have asked lots of questions and gathered answer to find out the best possible clue that is related to my case. Those questions are given below:

- Is the pain constant, intermittent, and early morning stiffness & sleep disturbance? The reason for asking this question to identify causes of pain such as mechanical, non-mechanical, pathological involvement or any kind of arthritis.
- Is the pain gradual or sudden onset and unilateral or bilateral referred?
- The intendant to ask this question was to detect the source of symptoms.
- Which activities aggravate or relieve your symptom?
- Which site are you fell pain at first?
- These two questions asked for to identify the exact which structure is involved and to see the severity of symptom.
- Can you explain me your nature of pain such as burning, tingling, dull-aching, electric-shock & lancinating like?
- This question was asked to understand the characteristics and nature of pain so that I can easily distinguish between somatic, visceral or radicular pain.
- Does your pain influence by cough, sneezing or deep breathing?
- This question was asked to see the relationship with dural involvement.

- Any sequence of trauma or fell disturbance during walking?
- This question asked to find out any cord compression.

2.3.2 Hypothesis generation: Hypothesis generation was vital part of the systematic problem-solving process. It was an inductive reasoning, which provides a set of specific observation to a generalization. After cue acquisition and getting the answers, few hypotheses are generated in the clinician mind which are given below:

- There may have an association of pathological cause due to early morning stiffness and sleep disturbance influence this hypothesis
- Thoracic outlet syndrome may be another reason, intermittent numbness at her thumb and radiating pain at right forearm indicates this hypothesis.
- Cervical spondylosis may have strong relationship of symptom. Patient's age, gradual onset and radiating pain may have probabilities this hypothesis.
- Cervical disc prolapse with C6 radicular symptom may be main pain generator source. Pain on coughing and intermittent unilateral symptom such as numbness, radiating pain. In addition, pain characteristics was electric shock like and lancinating type pain according to the dermatome distribution. All of these provocative this hypothesis

2.3.3 Cue interpretation: It involves in appropriately evaluating which cues are most

relevant to my specific hypothesis under consideration. Elastin [14] reported a three point scale for cue interpretation where '+1' cue confirms hypothesis, '-1' disconfirms hypothesis and '0' cue does not contribute to hypothesis. The cue interpretation are given below

- Patient had no significant weight loss, pyrexia, systemic illness and pathological report. In this way the hypothesis of pathological involvement disconfirms (-1).
- Even though, there is radiating pain at the lateral aspect of the forearm and thumb, the adson's test (specificity 87% and sensitivity 94%) was negative and also X-ray do not show any cervical rib [15]. Thus, this hypothesis has no contribution on the symptom (0).
- The radiological findings does not show any degenerative change such as osteophytic formation, intervertebral discs space [16]. These finding exclude the possibilities of cervical spondylosis. Clinician confirmed that the hypothesis of cervical spondylosis has no contribution to the symptom (0).
- The dural symptom (pain on coughing) was positive. Clinician perform spurling test (40%-60% Sensitivity, 85%-95% specificity) by lateral flexion and rotation to the affected side with axial compression of the head reproduces radicular pain and found positive. Clinician also performed neck distraction test (40%-50% Sensitivity, 90% specificity) and found relief of radicular symptoms when grasps patient's head under occiput and chin and then lifts, applying axial traction . Examiner also noticed that her pain location according to the C6 nerve

root that means pain at the neck, lateral aspect of the forearm and first and second digit. Examiner also performed upper limb tension test (ULNT1) for C6 symptom and this test done by shoulder depression, shoulder abduction 110°, wrist and finger extension, shoulder lateral rotation, elbow extension, contralateral lateral flexion of the cervical spine where the sensitivity of 0.97 and a specificity of 0.69 [17]. Moreover, active range of motion of cervical ipsilateral rotation, lateral flexion decreased. Conversely, Babinski sign was negative. All of these cue strongly confirm the hypothesis no IV (+1).

2.3.4 Hypothesis evaluation: The final stage of hypothetico deductive approach was hypothesis evaluation. I made weighing up the advantage and disadvantage of each possible explanation for patient's sign and symptom and choosing the favored one by the evidence. After completion of all ideas, I would like to say the hypothesis number IV support the evidence [7] stated that although radiculopathy and radicular commonly occur together, radiculopathy can occur in the absence of pain, and radicular pain can occur in the absence of radiculopathy. Radicular pain is usually caused by compression of the nerve root due to cervical disc herniation. The pain quality was lancinating and electric shock like which is radicular pain [9]. A double blinded randomized clinical trial (RCT) was conducted to find out the efficacy of neural mobilization with manual cervical traction (NMCT) for reducing cervical radiculopathy patient's pain [18]. They found significant difference between control group and experimental group and suggested that NMCT

can pain relief and increase range of motion. Experimental group received manual cervical traction simultaneously with neural mobilization and conventional physiotherapy and control group received manual cervical traction along with conventional physiotherapy.

2.4 Intervention

I have started intervention with the Mckenzie Mechanical Diagnosis and Therapy (MDT) of cervical spine. Then neural mobilization with manual traction, cervical stability training and postural reeducation. The description of these interventions is given below.

2.5 Outcome measurement

Outcome measurement tool included visual analogue scale (VAS) for pain intensity Goniometer for range of motion (ROM) and Manual muscle testing technique by using OXFORD muscle grade scale to assess the muscle strength of cervical spine. The reliability of VAS is 0.94 [19]. On the other hand, disability was measured by Neck Disability Index (NDI). NDI is a commonly used outcome measure to demonstrate the actual level of disability among patients with neck pain and also it has higher level of validity and reliability [20].

Red flags	Yellow flags	Blue flags	Black flags
No VBI sign and symptom such as dizziness, dysarthria, dysphagia, diplopia, drop attack and perform extension rotation test (Kerry, Taylor, Mitchell, McCarthy, & Brew, 2008). No sign of weight loss, night fever etc.	Depressed Negative mood Social withdraw	Poor family support Low grade income	Poor ergonomics Lifting frequency Work heaviness.

Table 1: Flags.

Interventions	Description
Mckenzie MDT for cervical spine	Repeated retraction in lying, 10 repetition 2 hourly which complemented by sitting and standing for first week
NMCT [18]	Neural mobilization and manual cervical traction were given at the simultaneously. One physiotherapist applied MCT for one minute while the other physiotherapist applied neural mobilization using a slider technique in a smooth and rhythmic manner. The slider technique consisted of the alternation of elbow extension and wrist flexion, with elbow flexion and wrist extension. After application for one minute, the subjects took a rest for 30 seconds. The same motions were repeated six times for a total of 10 minutes.
Cervical stabilization exercise [22].	After the end of the 4 weeks stability training of the cervical spine started.
Patient education	correct posture, household activity modification and ergonomics.

Table 2: Interventions.

Variable	Day -1	6 th Weeks	Measurement tool
Resting pain	7	1	VAS
Pain during activities	8	1	
Cervical flexion	20 degree	50 degree	Goniometer
extension	25	60 degree	
rt side flexion	20 degree	45 degree	
lt side flexion	35 degree	45 degree	
rt side rotation	30 degree	80 degree	
lt side rotation	60 degree	80 degree	
Cervical muscle strength			OXFORD muscle grade scale
flexor	G-IV	G-V	
extensor	G-IV	G-V	
rt flexor	G-IV	G-V	
rt rotator	G-IV	G-V	
Disability status	60%	20%	NDI

Table 3: Outcome measurement.

4. Discussion

Neck pain is one of the most common musculoskeletal disorder in the general population, second only to low back pain. Cervical pain or neck pain with radiculopathy is a common presentation in our daily practice. Cervical radiculopathy is a dysfunction of a nerve root in the cervical spine resulting in producing radicular symptom such as pain, paresthesia, weakness, numbness in the upper extremity. Clinical reasoning refers to professional judgments made before, during and after clinical sessions in physical therapy and it support professional autonomy [21]. Though, I have a propositional knowledge but due to enough lack of non-propositional knowledge and novice practitioner, I went through the HDR process instead of pattern recognition. Recently a randomized control trail was conducted on cervical radiculopathy patient [18]. The

primary goal was effectiveness of cervical neural mobilization with manual traction which treatment approach was applied in our current study. In that randomized trial, patient receive 4 weeks of physiotherapy treatment, outcome measurement was pain and functional disability. Finally, they concluded that neural mobilization with cervical traction is significantly effective for pain reduction, reducing the functional neck disability and increased range of motion. So, in our study found similar effect to the patient.

McKenzie MDT for cervical spine, neural mobilization, manual cervical traction along with cervical stabilization exercise was used for this cervical radiculopathy patient. After following this process, at the end of 6th week patient was smiling face and tickled mood. She can participate in routine and

activities as well as her family member became supportive and helpful. Now she is continuing treatment as follow-up patient with a pleased.

5. Conclusion

Clinical reasoning is the foundation in our clinical practice. It enables the therapist to take the best-judged action for individual patients and make sure quality service. McKenzie MDT for cervical spine, neural mobilization, manual cervical traction along with cervical stabilization exercise was effective for this cervical radiculopathy patient.

Conflict of Interest

No conflict of interest is relevant to the content of this case study.

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