Management of a Case with Spondylolisthesis & Disc Prolapse through Clinical Reasoning Process

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Abstract: Clinical reasoning is the thinking and decision making process in professional practice of a health professional. In our routine and daily practice, each and every case constitutes different types of presentations related to clinician’s knowledge, cognitive skill, decision making skill and clinical reasoning skill. Low back pain with radicular symptom among middle age female specially housewife considered as one of the most common musculoskeletal features in now a day. Some of the cases extend to disabling condition that limits activity, performance and lead to disability. Clinician compresses inductive and deductive ways of clinical reasoning to solve this condition. Sometimes, all the features can’t be solved in a single reasoning procedure based on knowledge and cognition. With the induction of unfamiliar symptoms clinician looks for the cues and decides with the formation and evaluation of hypothesis. In this case, the case of low back pain with radicular symptom has been treated with both inductive and deductive strategy of clinical reasoning skill. Also, the client’s desire, limitation, disabilities and occupational performance has been considered as a parameter to improvement. Within few weeks with an efficient and scientific way of clinical reasoning skill, the case had a satisfactory improvement in his functioning, disability and health status.

Key Words: Clinical reasoning, Low back pain, Hypothetico-deductive reasoning, Pattern recognition.

Introduction

Reasoning refers to a cognitive process and it helps to health professionals to form a valid conclusion and a scientific decision making. The cognition process proceeds at lateral prefrontal cortex that accumulates episodic, conceptual & sensory control over time to generate a motor response. Clinical reasoning provides right way of practice through thought process that is the basic fundamental base of a professional practice. Clinical Reasoning is the key component of today’s therapeutic practice, and experts agreed that it has a vital role on documentation, education, health service management and innovation for the society (Norman, 2005).Clinical reasoning strongly helps health professionals to make a proper scientific decision which helps professionals to make diagnosis and provide quality treatment (Higgs & Jones, 2000).

Pattern recognition is the process which helps an expert practitioner to make diagnosis properly within a short period and helps to provide evidence based quality treatment. In most of the cases experts are reflected by clinical reasoning method. In this situation Pattern Recognition is the precise, swift, feasible, prevailing strategy that helps professionals enabling a scientific clinical reasoning (Jones et al., 1995). Besides this hypothetico deductive reasoning helps the novice practitioner and also expert practitioner in case of critical and unfamiliar condition to solve a problem and make a diagnosis. Rahman et al. (2016) mentioned that in case of
hypothetico deductive reasoning constitutes cue acquisition that involves recognizing related data or information. After cue acquisition, hypothesis generation played a vital role for problem solving approach.

Now a day’s Low-back pain is a major health problem in all over the world. 70-80% people have suffering with LBP at any time of their life (Duijvenbode et al., 2011). LBP may occur due to degenerative changes, disc herniation and spondylolisthesis with others causes. Spondylolisthesis and disc prolapsed are more common causes of LBP (Yang et al., 2015). Degenerative spondylolisthesis means the slipping forward of onevertebrata on another and approximately around 50 years of age and women are more affected. In this case L4-L5 level is more vulnerable segment. On the other hand, disc herniation occurs when a disc materials bulding out from intervertebral disc due to any degeneration or other traumatic causes (Weinstein et al., 2007).

The purpose of this study is to review a case study of Spodylolisthesis & Disc prolapse through different clinical reasoning process.

**Description of case:**

**Patient history:**

Mrs. A is 42 years old women is a housewife with two children. She was suffering from back pain with left lower limb radicular symptom for few months. Initially she ignored the pain and continued working more her household activity. Gradually, she was feeling weakness in her left lower limb. She consulted with a physician and advised surgery. Her relatives advised her to consult with Physiotherapist. She has been treated with various types of specialized concept and within three weeks she had a vast positive response in back pain and associated symptom. Within 6 weeks of treatment she progressed in pain and radicular symptom, muscle strength and gradual activity participation. She also had an experience of adapting the situation and upholding her household activities. She is continuing the follow up session once in a month as a consequence of satisfactory recovery of her symptoms and relief of recurrence and future well and healthy life. Patient also noticed that she felt mild fever and pain during night. It is necessary to rull out this red flag. But patient has yellow flag that felt weakness at lower limb muscles.

**Case problem according to PICO**

| P | Low back pain due to Spondylolisthesis & Disc prolapsed |
| I | Mackenzie Approach (RFIL) with lumbar traction |
| C | Stabilization and strengthening exercise |
| O | Pain, ROM and Disability |

**Pattern Recognition**

This case was 43 years female and housewife felt several episode of back pain and for this reason she took rest for some days and also went to medicine specialist for her recovery. But from last six months, she was feeling pain in left side lower limb and mainly at anterior portion of thigh. Then she consulted with a physician and had an X-ray of Lumbar spine. After that she knows about that she has degenerative changes among multi-segment of lumbar spine with spondylolisthesis at L4- L5 level. She had a discussion with her neighbor and relatives about her condition and they suggested her to consult with a Physiotherapist. During initial emergency monitoring session, Clinician was reliable on propositional and non-propositional knowledge to find a well-structured automated retrieval. Anterior portion of thigh pain, Positive traumatic history (fall down), positive SLR (pain and limitation at less than 30 degree), referred pain (left lower limb), More pain and difficulty during walking, Slipped off vertebra during palpation introduced a primary idea about condition (Westein et al., 2007).

In addition, low midline sill sign test is confirmatory test to identify spondylolisthesis. Ahn and Jhun (2015) stated this low midline sill test indicates slipped off during lumbar spine palpation. In the 1st session, clinician decided to continue the mechanical diagnosis and treatment in McKenzie method. Clinician found poor posture (protruded abdomen) in sitting & standing, also taken consideration to in weakness of ankle dorsiflexion and extension of the great toe. This deficit may also diminish the Achilles tendon reflex (Donally & Veracallo, 2018). Moderate movement loss found in extension and minimum movement loss found in flexion and pain at Numeric Pain rating scale-8 out of 10. In Movement test, repeated flexion in lying mild centralized the symptom and reduces pain assuming that clinician found the right way of intervention. Kjellman and Oberg (2002) found Mechanical Diagnosis and therapy has greater efficacy rate than conventional physiotherapy to improve pain intensity. Patient’s visual, verbal and
tactile cues informing that within six sessions, clinician had some positive outcome in efficacy and accuracy of treatment. Efficacy part was confirmed by the previous sign symptom and physical examination with special test. On the other hand it confirms accuracy by all of this and X-ray with special test. Pain decreased up to 2 in Numeric pain Rating Scale, but ROM as same as previous. There were some improvements in sensory discomfort and clinician was assuming that, this will improve through prototype model of categorization. But there were no change in weakness of dorsi flexor and great toe extensors. From clinician’s previous patient’s experience, I thought that after few more sessions, clinician started stabilization exercise, strengthening exercises and pelvic floor exercises for left lower limb, dorsi flexors and great toe extensors muscles.

Hypothetico Deductive Reasoning

After the treatment at three weeks, it founded that pain was not totally centralized and peripheral tingling was present with buttock pain. Treating LBP spine in MDT concept was effective but this radiculopathy and tingling during walking has become a challenge to manage. In clinician’s mind, finding the possible reason was the priority task. Clinician planned to start are assessment, generate hypothesis and predict the best possible way to solve the pain. Prediction of the truth of each hypothesis and working on searching the findings behind, entitled as Hypothetico-deductive method of reasoning. Clinical reasoning is a continuous process that goes on through the ongoing intervention procedure. Clinician started to ask question and gather answers find the possible clue related to right scapular pain (Jones et al., 1995).

The question included:

i. What made the pain and tingling appear? Did it persist when changing position?
ii. Is there any other structure involve like intervertebral disc with nerve root impingement and a spontaneous onset?
iii. As the pain and tingling, where did it started or seemed to be referred from?
iv. Is there any relation of pain with her food habit, medication?
v. Was the pain associated with night fever, cough and weight loss?

The question was aiming to find out the association of any pathological connection of the pain. These cue questions were directed to find out the association of overuse or stress contributing the pain. After getting answer to the cues, clinician generated few hypotheses. The hypotheses were as follows:

i. There may have an association with intradiscal pressure corresponding nerve root impingement as left lower limb neurological sign and symptoms.
ii. The case may represents a case of disc prolapsed with the multi-segmental involvement may generate the provability of the hypothesis.
iii. There may have a strong association with SI joint pain and hip OA. Because patient sometimes feels pain which unable to associate definitely.
iv. The central protrusion leads to red flag sign.

The steps to interpreting the cues need more clinical and supportive knowledge. Clinician consulted with another senior expertise that had more than tenyear’s clinical experience in this field. The cue interpretations were as follows:

i. Patient had no systemic illness in clinical sign, pathological reports. Thus the hypothesis of pathological Involvement disconfirms the possibility (-1).
ii. Excluding SI joint pain and hip OA for non-involvement of gait & bowel-bladder. The special clinical test has made a confirm conclusion that the symptoms were not arising from the possibility (-1).
iii. In similar clinical presentation and exclusion of other pathological symptom distribution with sensory-motor involvement. The condition has no contribution on the symptom (0).
iv. The condition may not be from unfamiliar conditions. The MRI reports and clinical sign relate the involvement of prolapsed lumbar intervertebral disc in L4-L5 which causes numbness, tingling and weakness at great toe extensors muscles also.
v. With the help of senior colleague, started functional examination in three steps. Firstly, dural sign test, then femoral leg test and finally well leg test. This made clinician confirmed about that unknown cause has no contribution to the symptom (0) and there is strong connection with mechanical cause.

Sequence of mechanical stress responded the peripheral pain. She had not taken appropriate rest for her condition and did not stop her
regular daily household activities in modified posture. This made confirm the hypothesis of mechanical relationship of peripheral pain and tingling to the left lower limb (+1).

The cue confirmed the hypothesis and clinician realized treating left of the component and regulating home exercise made a significant improvement in referred pain and tingling. Application of Repeated Flexion in lying, 10 Rep. every 2 hour along with Manual lumbar traction and home advice on activates in daily. Also focus on use of Lumbar corset (Brecino-gongales et al., 2016). The exercise module and postural advice about work, journey and household activity control with prescribing lumbar corset making the gradual disappear to peripheral symptoms. Thus the hypothesis has been evaluated to be the right way of problem solving strategy.

**Intervention summary**

The course of intervention started with Mackenzie Mechanical Diagnosis and Therapy of lumbar spine. Repeated Flexion in Lying, 10 repetitions every 2 hours. From 4th weeks started lumbar traction and pelvic floor strengthening exercise with sustain back extension. Strengthening of back muscle and stabilization exercise of lumbar spine has been started after 3 weeks as adjacent therapy. But at first therapist intention for the patient to stop the activity or sport that evokes the back pain for an average of 2-4 weeks. Flexion distraction therapy also plays a vital role for listhesis patient (Donnally & Varacallo, 2018). LBP occurs due to spondylolisthesis may be benefited by thoracic spine mobilization including stretching of hip flexors, piriformis muscles (Mohanty & Pattnaik, 2016).

**Outcome Measurement**

Outcome measurement and tool included Numeric Pain rating Scale (NPS) to evaluate pain intensity. Spine range measured by Goniometer and Muscle strength of right upper limb has been measured by Manual Muscle Testing scale out of 5. Disability measured by modified Oswestry low back pain Questionnaire. Valente et al. (2011) stated, NPS has superior significance to express pain intensity.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Variables</th>
<th>Day-1</th>
<th>Week 3</th>
<th>Week 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain (NPRS)</td>
<td>Resting Pain</td>
<td>8/10</td>
<td>5/10</td>
<td>2/10</td>
</tr>
<tr>
<td></td>
<td>Pain during activities</td>
<td>9/10</td>
<td>5/10</td>
<td>2/10</td>
</tr>
<tr>
<td>ROM (Goniometer)</td>
<td>Lumbar Flexion</td>
<td>Moderate loss of AROM</td>
<td>Mild loss of AROM</td>
<td>FAROM</td>
</tr>
<tr>
<td></td>
<td>Lumbar Extension</td>
<td>Moderate loss</td>
<td>Mild loss</td>
<td>Mild loss</td>
</tr>
<tr>
<td>OXFORD</td>
<td>Manual Muscle Testing in dorsiflexor and great toe extensor (out of 5)</td>
<td>2/5</td>
<td>3/5</td>
<td>5/5</td>
</tr>
<tr>
<td>Modified Oswestry</td>
<td>Self-reported function</td>
<td>10% ADL</td>
<td>60% ADL</td>
<td>90% ADL</td>
</tr>
<tr>
<td></td>
<td>Participation in family and social activities</td>
<td>Unable to attend</td>
<td>Performs daily household activity with rest and others support</td>
<td>Performs household activity independently</td>
</tr>
</tbody>
</table>

**Discussion**

The process of solving the case was using the combined approach of the inductive and deductive clinical reasoning skill. At first tried to solve this case with strictly by a process of pattern recognition which wasn’t sufficient to solve the peripheral pain of left lower limb with tingling sensation. As a result clinicians made a choice of Hypothetico-deductive reasoning and that made a proper solution for the case. Clinician also noticed that patient was depressed and anxious about her condition. So therapist tried to modify her daily activities like change her cooking, prayer position and also tried to involve her family members specially her husband for her proper recovery, future prognosis, avoid recurrence and psychological support. Therapists also tried to feel patients mind and find out the inner cause of her problem by using narrative reasoning process. Jones et al. (1995) mentioned that with the
consideration of error which can occur when overemphasis on findings related to existing hypothesis impose to clinical error. This limitation occurs during clinician’s assessment and intervention. It leads to potential error to clinical reasoning in this case. In case of this study we learn that it more appropriate if at first we make a decision from hypothetico deductive reasoning process than we can make a conclusion as accurately as early. This review study helps to learn about this type of condition as a result we can make accurate decision quickly in this way. On the other hand it helps professionals to learn that if they firstly use hypothetico deductive reasoning than he or she can get a quick result for decision making.

References


Appendix 1
Reliability of clinical examination

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Description &amp; Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palpation</td>
<td>Palpates vertebral column &amp; ASIS. Find slipped off vertebra and no asymmetry in ASIS.</td>
</tr>
<tr>
<td>SLR</td>
<td>Limited on 30-70 degree.</td>
</tr>
<tr>
<td>ROM (L/S)</td>
<td>Limited during flexion &amp; Extension.</td>
</tr>
<tr>
<td>Sensory Motor</td>
<td>Motor defect (Dorsi flexors muscle and great toeextensors)</td>
</tr>
<tr>
<td>Femoral nerve test</td>
<td>Prone knee bend for neural tension test offemoral nerve (L2-L4) and result is negative.</td>
</tr>
<tr>
<td>Well leg test</td>
<td>Test wasalsonegative.</td>
</tr>
</tbody>
</table>