

# A Syndrome (Pattern) Approach to Low Back Pain

Hamilton Hall MD FRCS  
Professor, Department of Surgery, University of Toronto  
Medical Director, CBI Health Group  
Executive Director, Canadian Spine Society

## *Preamble:*

More than 90% of back pain seen in family practice is the result of minor alterations in spinal mechanics. It is rarely the result of malignancy, infection, systemic illness or major trauma. Most back pain is mechanical, that is pain directly related to movement or position. The pain arises from a structural element or elements within the spine, which in the overwhelming majority of cases, cannot be precisely identified.

“Distinct patterns of reliable clinical findings are the only logical basis for back pain categorization and subsequent treatment.”

Quebec Task Force 1987

Distinct patterns of reliable clinical findings are syndromes. A syndrome is a constellation of signs and symptoms that appear together in a consistent manner and respond to treatment in a predictable fashion. The key to the initial treatment is identifying the correct syndrome; this identification requires a precise history and concordant physical examination.

## History

The two essential questions:

### **“Where is your pain the worst?”**

You must determine if the pain is back or leg dominant. Back symptoms usually involve both the back and the leg but in almost every case, one site will predominate. That distinction is essential for pattern recognition.

The pain is considered back dominant if it is worst in the low back, buttocks, coccyx, groin or over the outer aspects of the hips. The pain is considered leg dominant when the pain is worst around and below the lower gluteal fold, in the thigh, calf or foot.

### **“Is your pain constant or intermittent?”**

This question must be very clear and specific. It is best asked in two parts:

“Is there ever a time during the day when your pain stops, even for a brief moment and even though it may quickly return?”

“When your pain stops, does it disappear completely; is it totally gone?”

The Pattern question:

**“Does bending forward make your typical pain worse?”**

“What are the aggravating movements or positions?”

The mandatory question:

**“Since the start of your back trouble, has there been a change in your bladder or bowel function?”**

Asking the question in this way avoids confusion with long standing and unrelated urinary or GI problems. The changes that suggest a possible Acute Cauda Equina Syndrome are:

- urinary retention followed by insensible overflow
- faecal incontinence

The functional limitation question:

**“What can’t you do now that you could do before you were in pain and why?”**

The other questions:

**“What are the relieving movements or positions?”**

**“Have you had this same pain before?”**

**“What treatment have you had before?”**

## **Physical Examination**

The physical examination is not an independent event. It should be designed to verify or refute the history.

Performing the examination in the most efficient manner usually means starting with the patient standing then progressing to kneeling, sitting on a chair, sitting on the examining table, lying supine and lying prone. Select the optimum position for each test.

### **Observation:**

General activity and behaviour

Back specific:

Gait

Contour – subtle malalignments are not relevant

Colour – areas of obvious inflammation

Scars

**Palpation:**

Of limited value – briefly palpate for tenderness and gross deformity

**Movement:**

Flexion – reproduction of the typical back pain and rhythm of movement

Extension – reproduction of the typical back pain and rhythm of movement

Other spinal movements – *when suggested by the history*

**Nerve root irritation tests:**

## Straight leg raise test

patient lies with the other hip and knee flexed  
passive test - the examiner lifts the leg  
reproduction or exacerbation of the typical leg pain  
reproduction of back pain is not relevant  
produced at any degree of leg elevation

Femoral stretch test – *when suggested by the history*

passive test - the examiner lifts the leg  
patient prone with the knee extended  
reproduction or exacerbation of the anterior thigh pain  
back pain is common but not relevant

**Nerve root conduction tests:**

**The first test in each group (*in italics*) is all that is required for a basic screen.**

## L3-L4

*Knee reflex*

*test with the patient seated, lower leg hanging free*

## Quadriceps power

test with patient seated – extend knee against resistance

## L5

*Extensor hallucis longus*

test with the patient seated, foot on floor – elevate great toe against resistance

## Heel walking (L4)

walk five steps at maximum elevation

## Ankle dorsiflexion (L4)

test with the patient seated, foot on floor – elevate forefoot against resistance

## Hip abduction

Trendelenburg test – the patient stands on one leg and then on the other. The hip abductors are tested for the leg on which the patient is standing. The movement of the contralateral crest is the marker. A normal test is symmetrical.

S1

*Flexor hallucis longus*

test with the patient seated, foot on floor – curl great toe against resistance

Toe walking

walk five steps at maximum elevation

Plantar flexion

toe raise on both feet and then on the affected side – examiner supplies balance

Ankle reflex

test with the patient kneeling

Gluteus maximus muscle tone

test with patient prone – palpate buttocks as patient tenses and relaxes

**Sensory testing:**

Optional – for confirmation of root level – *when suggested by the history*

**Ancillary testing:**

Hip examination – typical pain on flexion-internal rotation– *when suggested by the history*

Peripheral pulses– *when suggested by the history*

Abdominal examination– *when suggested by the history*

The mandatory tests:

**Upper motor test**

plantar response, clonus – any upper motor finding negates a low back mechanical diagnosis.

**Saddle sensation**

lower sacral (S2,3, 4) nerve root test – the same roots that supply saddle sensation supply bowel and bladder function.

# Patterns of Back Pain

## Pattern 1

(probably discogenic pain)

### History:

Pain is back dominant – pain is felt most intensely in or over the:

- back
- buttock
- coccyx
- greater trochanter(s)
- groin

Pain is **always** reproduced or increased with back flexion.

Pain may be constant or intermittent.

### Physical Examination:

Back dominant pain – the location on examination matches the location on history.

The pain is reproduced or increased with back flexion.

The neurological examination is normal or unrelated to the pattern.

### Pattern 1 Prone Extension Positive PEP

Pain is reduced after the patient performs five prone passive back extensions. Raise the upper body by pushing up with the arms. Move the hands far enough forward to fully extend the arms and lock the elbows while the hips remain down. There is a “directional preference”.

### Pattern 1 Prone Extension Negative PEN

Pain is either unchanged or increased after the patient performs five prone passive back extensions. There is no “directional preference”.

## Pattern 2

(source is very unclear)

### History:

Pain is back dominant.

Pain is reproduced or increased with back extension.

Pain is **never** increased with back flexion.

Pain is **always** intermittent.

### Physical Examination:

Back dominant pain – the location on examination matches the location on history.

The pain is reproduced or increased with back extension.

The pain is unchanged or reduced with back flexion.

The neurological examination is normal or unrelated to the pattern.

## **Pattern 3**

(sciatica)

### History:

Pain is leg dominant – around or below the gluteal fold and can extend to the:

thigh

calf

ankle

foot

Leg pain is affected by back movement or position.

Leg pain is **always** constant.

### Physical Examination:

Leg dominant pain – the location on examination matches the location on history.

Leg pain is affected by back movement or position.

There **must be** an abnormal neurological finding:

*a positive irritative test and/or a conduction loss.*

## **Pattern 4 PEP**

### History

Pain is leg dominant

Leg pain is **always** intermittent

Leg pain is worse with flexion

### Physical Examination

Rarely a positive irritative test and/or a conduction loss

Always better with unloaded back extension movement or position

*leg dominant pain that responds to mechanical back treatment*

## Pattern 4 PEN

(neurogenic claudication)

### History:

Pain is leg dominant.

Leg pain is **always** intermittent.

Leg pain is increased with activity in extension.

Leg pain is relieved with rest in flexion.

### Physical Examination:

The irritative tests are **always** negative.

There may be a conduction loss – in long standing cases.

## Pain Control Strategies

### General treatment principles:

**Education.** Confirm the benign mechanical nature of the pain. Be clear that back pain is usually a recurrent problem but that it can be controlled with reasonable modifications to life style and activity. It is not the result of a serious medical problem, in fact not the result of a medical condition at all. Lasting pain relief and full function are both practical and possible with sensible self-management.

**Counter-irritants.** Ice, heat, liniment, massage and similar modalities are helpful. They can usually be provided without professional intervention.

**Posture correction.**

**Direction specific movement.**

**Medication.** There is no need for narcotic medication to treat Patterns 1, 2 or 4. OTC analgesics or NSAIDs in addition to mechanical therapy should be sufficient. Acute Pattern 3 frequently requires a short course of narcotics; NSAIDs are seldom effective.

## Pattern 1 PEP

### Postural correction

Standing: foot stool

Sitting: large diameter lumbar roll

Lying down: night roll

large pillow between the legs to elevate the knee higher than the hip

### Direction specific repetitive movement

Lying down: unloaded prone passive extensions (the sloppy push-up)

elevate the upper body using the arms

lock the elbows

keep the hips down

sag the low back

move slowly, don't hold the elevated position

Standing: extension if demonstrated effective on the physical examination

Frequent sessions during the day

Prescribe a specific interval and give the number of repetitions per session

If you don't take it seriously, neither will the patient

## **Pattern 1 PEN**

### Postural correction

Standing: foot stool

Sitting: small lumbar roll

Lying down: night roll

large pillow between the legs to elevate the knee higher than the hip

### Scheduled rest

Specific rest positions:

Z lie

prone over pillows

### Progress to a direction specific response to movement

All Pattern 1s should ultimately improve with unloaded prone passive extensions. The Pattern 1 PEN starts with no directional preference and usually cannot tolerate repeated extension movements.

Retreat as far as required to control the pain then advance toward the ultimate objective.

flexion position (unloaded)...z lie

flexion movement (unloaded)...knees to chest

extension position (unloaded)...prone over pillows

extension movement – unloaded prone passive extensions

### Proceed as Pattern 1 PEP



## Pattern 2

### Postural correction

Lying down: large pillow between the legs to elevate the knee higher than the hip

### Direction specific repetitive movement

Sitting: flexion stretches

slump forward to lower the shoulders between the knees

push up using the arms with the hands on the knees

Standing: step flexion

stand with one foot up on a stool

bend forward to put the chest on the thigh

push up using the arms with the hands on the elevated knee

Frequent sessions during the day

Prescribe a specific interval and give the number of repetitions per session

Pain control is rapid and easily sustained

## Pattern 3

### Scheduled rest

A specified time out of every hour during the day

The remaining time is for necessary activities

Specific rest positions:

Z lie

prone over pillows

prone on elbows

hands and knees

### Progress to a direction specific response to movement

As the leg dominant pain subsides (resolving acute sciatica takes from two to six weeks) the back pain will become dominant. Proceed as for a Pattern 1 (PEP or PEN) or Pattern 4 PEP.

## Pattern 4 PEP

### Postural correction

Standing: foot stool

Sitting: large diameter lumbar roll

Lying down: night roll

large pillow between the legs to elevate the knee higher than the hip

Direction specific repetitive movement

Lying down: unloaded prone passive extensions (the sloppy push-up)

elevate the upper body using the arms

lock the elbows

keep the hips down

sag the low back

move slowly, don't hold the elevated position

Frequent sessions during the day

**Pattern 4 PEN**

Improved Postural Control

abdominal strengthening

core strengthening

pelvic tilt

Gradual improvement

Long term commitment

Excellent surgical candidates

**The system is simple to understand**

**It is not so easy to deliver**

**It requires careful attention to detail and precise technique**