Back Pain: A Simplified Guide

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Shrimati Y is suffering from back pain for more than 5 years. She has been diagnosed as Slip disc / Discogenic pain / Back Sprain / Metabolic back pain by various specialists. She has been on and off medication for more than 4-5 years and with on and off physiotherapy.

This sounds like a common patient who has back issues which has not settled and patient is in pain. Back pain is one of the most common pain symptoms that bring a patient to the doctor. Almost 8-9 of 10 human beings will suffer from back pain once in a lifetime at least. Low back pain is one of the 10 most common diseases globally. Persistent low back pain could be seen in 5 to 36% of patients’ globally. The economic impact of back pain is huge, more than 100 billion USD which includes direct and indirect cost to the economy.

Pain has been slowly recognised around the world as 5th vital sign and vital signs are taken seriously. Purpose of recognising pain as a vital sign is to improve pain control of the patient to effectively deliver quality care to the patient. The same is true for back pain and controlling back pain will surely improve the disease burden on society. As the back pain is controlled it might be able to improve the health and wealth of the society!

Aetiology

Back pain slowly is becoming an epidemic and our modern life style has lot to do with it. Sedentary lifestyle, indoor activities and poor nutrition are few reasons why we are seeing increased back pain patients especially in urban setting. Another important reason for back pain is smoking which accelerates degenerative process and hereditary factor. Good thing about back pain is that most are benign and most of it resolves on its own with or without doctors involvement in 6 to 12 weeks. Most back pain falls in the category defined as Nonspecific back pain (NSBP). Incidence of back pain increases with age.

NSBP is very common but the more serious ones like infection, trauma, disc prolapse, tumour or instability of spine etc. are fortunately less common. 1-2 % of general population might be suffering from severe back pain on a regular basis which will restrict their physical activity which could be NSBP or specific back pain (SBP). Any patient who has been suffering from pain for more than 6-12 weeks without remission will need extra attention of medical treatment whether it is NSBP or SBP.

Most common cause of spine related back pain of non-urgent nature is ageing of the intervertebral disc and surrounding spine structures resulting in Internal Disc Derangement (IDD) which is a natural process and in few individuals causes back pain. It is mainly a result of dehydration of the disc which leads to inflammation of the disc which stimulates the nerve endings in the annulus fibrosus of the disc to cause pain. This might cause annular tear in the annulus fibrosus causing severe episode of back pain or in severe cases nucleus pulposus might come out to cause prolapsed intervertebral disc (PID) (Figure 1). There are few misnomers for PID in common language like Slip disc or Sciatica. Other common reason is myofascial pain of the back. This might be as a result of IDD or mechanical back
issues due to poor posture or other back issues or just spontaneous.

If back pain is not controlled, it starts a vicious cycle where the pain persists (Figure 2). After repeated episodes of back pain, in about 1/3rd of the patients, pain could become neuropathic. Back pain is usually nociceptive to begin with but repeated stress, trauma and nerve ending stimulation can lead to wind up phenomenon, sympathetic involvement and central sensitisation causing pain to become neuropathic. These patients might need prolonged pharmacotherapy with a prolonged rehabilitation.

Once the back pain becomes chronic, i.e. more than 3 months, after ruling out Red and Yellow flags, there is a possibility that various aetiological factors might get mixed and produce a confusing picture where one is not sure if back pain is physical or a functional issue or a disc problem or facet joint problem or a myofascial problem. This is where a multidisciplinary approach to back pain management is required. In this chapter we will mainly discuss chronic back pain management of both NSBP and SBP after ruling out any serious spine or functional issues.

Causes of Back pain: Back pain is not necessarily related to the spine. It could be due to postural issues, age, medical or gynaecological, urological, gastroenterological, myofascial or oncological.

**Non spine related back pain:** Emergency patients will have to be attended immediately while other less urgent would need attention but immediate intervention for them could wait. Commonly occurring problems are listed below.

- Emergency patients to be attended as soon as possible:
  - Myocardial infarction
  - Pulmonary embolism
  - Aortic dissection
  - GI perforation
  - Obstetrics issues like ectopic pregnancy/abruption placenta
- Less urgent patients: It is a big list, relatively common ones are given below:
  - Pyelonephritis
  - Ureretic colic
  - Dysmenorrhea
  - Endometriosis
  - Pregnancy
  - Ovarian conditions
  - Herpes zoster
  - Pancreatitis
  - Pelvic inflammatory disease
  - Hip joint arthritis
  - Sacroiliac joint arthritis or infections
  - Metabolic back pain
  - Multiple myeloma

**Spine related back pain:** Urgent problems of spine would need urgent surgical or medical intervention while less urgent back pain intervention could wait or immediate intervention is not required.

- Urgently needs to be attended are:
  - Cauda equina, neuro deficit of lower limbs with uncontrolled bladder and bowel function
  - Infection or abscess due to tuberculosis or other infections pressing on spine
  - Intra or extradural spine tumour
  - Vertebral body fracture pressing on spine
  - Spinal haematoma
- Less urgent back pain problems:
  - Discogenic spine pain due to internal disc derangement
  - Degenerative disc disease
  - Spondylothesis
  - Spinal canal stenosis
  - Stable vertebral fracture
  - Lumbar facet syndrome
  - Ankylosing spondylitits
  - Osteomyelitis of vertebral body

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**Fig. 2 : Vicious cycle of pain persistence**

![Flow Chart 1: Showing approach to a back pain](image)
• Discitis
• NSBP which could also include myofascial pain of back

Diagnosis

Once a patient presents with back pain, red and yellow flags should be looked for. If they are present then respective specialist would treat the patient. Approach to the back pain patient could be as it is detailed in the chart as follows in Flow Chart 1.

Before we discuss back pain treatment, few important things needs to be considered to identify potentially problematic back pain causes. “Red flags” in any back pain should be looked which will help identify serious spine pathologies and urgent treatment could be initiated. “Yellow flags” actually would be able to identify most of patient’s psychological issues and help identify the patients who may develop chronicity of back pain. This is the Bio-Psycho-Social model of back pain.

Red flags: Every back pain patient should be looked for serious spine pathologies. Once it is identified then a Spine surgeon or an able oncologist or physician should immediately take over the treatment of the patient with below symptoms and signs.

• Leg weakness, uncontrolled bladder and bowel function, erectile dysfunction, loss of limb sensation and imbalance of limb or ataxia
• Sudden new back pain, old age with back pain, history of malignancy or repeated urinary retention
• Fever, malaise, loss of weight, immunocompromised patient, long standing steroid use

Yellow flags: If these are identified then such back pain patients should be dealt with the help of an able psychiatrist and psychotherapist with good pain control with pain specialist and physiotherapist in a Multidisciplinary Pain clinic. Following points are important for a back pain patient with yellow flags.

• What is a patient’s attitude towards the back pain - especially if various treatments have been tried and patient is not compliant with rehabilitation of spine?
• What is patient’s understanding of the illness - some patients just think that they have something like cancer and they might become paralysed or die due to it and they will never be alright.

If the patients treatment is compensated by company or insurance or government reimbursement then they might keep taking treatment or not willing to join work or non-compliant to rehabilitation process of spine pain.

• Patients who talk negative about the illness, are depressed or blame everyone around should be dealt with cautiously. Patients having pain all over body is also an indication of overexpression and could pose difficulties ahead in their treatment for back pain.
• Patient who insists on certain words or sentences of the previous consultation without getting a proper understanding of the problem could be a difficult patient. So proper and clear communication is a must.

- Patients with other emotional difficulties such as ongoing depression and/or anxious states are at a high risk of developing chronic pain. Over expression with words like sickening due to pain, dying in pain or very uncomfortable with pain could explain their psychological profile.

- There tends to be two problems with families, either over bearing or under supportive. An uncomfortable relationship between husband and wife may make back pain treatment more difficult. Any patient of back pain should be diagnosed on above pattern so that anything important is not missed. Every patient of chronic back pain should be asked a detailed history so that a proper diagnosis could be done. Important things in the history of the patient to be checked are as follows:

• Rule out non spine causes - take urogenital/gynaecological or gastroenterological history of patient.
• Detailed history regarding back pain - start of pain, duration of pain, type of pain (dull/cramping/throbbing/colicky/sharp/burning), diurnal changes, referred component or radicular pain. This may guide us if patient has nociceptive or neuropathic pain.
• Position related/ activity related pain might tell us if there is any mechanical spine or myofascial issue of back pain. Does it increase on standing, walking, sleeping or sitting or change of position?
• Aggravating, relieving factors of back pain - either medication or rest
• Present treatment or medication, past treatment or surgery and result of previous treatment, personal history for kind of occupation, smoking and alcohol, any co-morbidities, family issues if any should never be missed.

Examination of a patient is important to come to proper diagnosis or back pain after taking a detailed history. All the examination findings are not very specific but a general guide to our diagnosis.

• Inspection: On patients entry his or her walk, antalgic gait, drag of feet should be noticed along with patients facial expression to see if the pain matches his or her expression or not. Swelling, discolouration of skin, previous surgery scar, location of pain should be looked for. Usually a paravertebral location might be myofascial or facetal pain. Gluteal or skin dermatomal distribution of pain with back pain might be due
to prolapsed intervertebral disc or trigger point

- **Palpation:** It is very important in NSBP patients. Tenderness of central spine area might be due to discogenic pain or PID or annular tear or vertebral body fractures while paravertebral tenderness might indicate myofascial or facet pain. Pain on touch would indicate allodynia which might be present in cases of nerve damage or nerve dysfunction or Complex regional pain syndrome i.e. CRPS. One might be able to find out a trigger point on palpation where pain is referred to leg on pressing a tender area like gluteal muscle or paravertebral muscle which can mimic a slip disc pain but is actually not PID

- **Movement of Spine:** Which spine movement is restricted should be noticed. Backward or sideways or lateral bending pain might be due to facetal or myofascial pain while forward bending pain might be due to disc. No pain on spine movement is common with spinal canal stenosis patient.

- **Neurological examination:** Sensory or motor neuron deficit should be examined in detail along with check for bladder and bowel involvement. Details of neurological examination are not possible to cover in this chapter but dermatomal involvement should be looked for.

- **Various tests to look for spine pathologies:** Straight Leg Raising test (SLR), crossed SLR, Femoral nerve stretch to check for Lumbar nerve root tension, Heel-toe walking to check motor weakness, Wink reflex for cauda equina, Schober test or occiput wall test for ankylosing spondylitis, Patrick’s and Gaenslen’s test for sacroiliitis or sacroiliac joint pain could be performed for diagnostic support.

### Investigations

List of various test needed to be done are given below.

- **Blood:** CBC, ESR, ANA, RA, HLA B27, CRP, VitD3, Ca, PTH, TSH, T3, T4 to support inflammatory or infective or metabolic back pain causes

- **Anatomical Imaging:** This actually would give us anatomical details of the possible pathological area of the body. The common ones used are
  - **X-ray:** Usually not very useful except with flexion and extension which might be able to tell about the spondylolisthesis
  - **CT scan:** CT scan usage is restricted in spine patients to patients who have metals in the body or patient is claustrophobic to MRI or non-availability of MRI. CT scan is being used more for interventional procedures of spine or biopsies, especially, 3D CT technology.
  - **MRI:** It is a great diagnostic modality with good detailing of spine structures for diagnosis including paravertebral muscles, disc, ligamentum flavum, nerve root and facet joints etc. Post-surgical structure could also be enhanced with Gadolinium contrast.
  - **Ultrasound:** Mainly useful for looking at superficial soft tissues around spine and gluteal or leg or Doppler studies of lower limb vessels. Main advantage is portability
and if needed in some cases for interventional procedure.

- **Metabolic Imaging:** This type of imaging would show the metabolically active or inactive spots in the spine. This might be able to tell us if there is infection, tumour or inflammation after correlating it to CT or MRI and history of the patient. It is mainly done through nuclear imaging scans
  - PET scan: mainly used in oncology patients to look for metastasis
  - SPECT scan: Bone scan can be used to look for facet joint or vertebral body involvements
  - Thallium scan
  - DEXA scan: It is useful to look for density of bone, to look for osteoporosis etc. Commonly used as screening tool.

- **Functional Imaging:** This type of imaging would help in finding out the pain generation area of the body by either injecting medicine to aggravate or relieve the pain or by seeing the brain activity due to pain. Common types of imaging are:
  - Diagnostic interventional pain blocks: It is a very interesting mode for diagnosing the origin of pain. Here interventional procedure is performed on a suspected part e.g. facet joint and if patient responds then the pain generator would be facet joint and if not then patient could be investigated further. Intervertebral discography is done to diagnose discogenic disc level in the patient. It can also be used for diagnosing psychogenic pain where a false intervention is performed to see patient’s response or his or her attitude to the treatment.
  - FMRI i.e. Functional MRI: It is an interesting modality where blood flow changes are noted in the area of brain to the response to pain or its treatment. Presently it is used in research purpose but its clinical use is becoming common.

### Treatment

Comprehensive or multidisciplinary approach to treat back pain is very important to get a long term benefit.\(^6,7,11\) As pointed out earlier Red flag/Yellow flag and non-cancer pain should be ruled out before starting the treatment mentioned below in flow chart 2. Also chronic back pain treatment is incomplete without proper rehabilitation guidance to the patient. Let us discuss about the chronic back pain patient who is without a red or a yellow flag.

**Principle of Back pain treatment**

- Always record VAS (Visual analogue scale, Figure 3) before starting any pain treatment which would be from 0 to 10. 0 would be no pain to 10 which is severe most pain. Once it is recorded then every follow-up it should be recorded so as to note the progress or deterioration of patient’s pain.
- Always consider least interventional modality first, once they fail then only try invasive interventional treatments (Flow Chart 3).
- Always consider combining different modalities like pharmacotherapy with physiotherapy with meditation or psychotherapy if needed to get the maximum benefit out of your treatment.\(^11\)
- Always consider return to work or activity to be the end point of your treatment so that rehabilitation of patient is quicker.

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**Fig. 3 : Visual analogue scale VAS**

**Flow Chart 3 : Step ladder treatment plan for back pain**
Pharmacotherapy

It is the first step in the treatment ladder of back pain treatment and invariably it is unfortunately incompletely or inappropriately done. Co-morbidities and other medications should be kept in mind especially if it is going to be a long term treatment. In acute cases few days of bed rest is good but after few days unless contraindicated gradual mobilisation of the patient is desirable along with pharmacotherapy. In chronic back pain patients rest is not required but active mobilisation and exercises would be important for patient’s rehabilitation. This can follow a simple step ladder approach so that analgesics are given safely and effectively to the patient.

- 1st step - Paracetamol, to be given in high dose 3-4 times a day along with physiotherapy or mobilisation with or without muscle relaxants for VAS 5-6. Patient with VAS less than 5 should be started with physiotherapy and psychotherapy with or without meditation.

- 2nd step - if patient does not respond to 1st step, then NSAID (Piroxicam, Diclofenac etc whichever suits patient) or Tramadol (if NSAID contraindicated or not tolerable) in appropriate doses could be added for a short time between 5-7 days along with physiotherapy and paracetamol in a patient with VAS 7-8. Adjutants in the form of muscle relaxants like thiocolchicoside could be added.

NSAIDs and cardiovascular risk: A considerable amount of literature has been generated recently on the increased cardiovascular risk, namely heart attack and stroke, with use of NSAIDs. We are all aware of the withdrawals of valdecoxib and rofecoxib from global markets. Recent data has tried to analyse and compare the CV risk of COX2 inhibitors with NSAIDs like diclofenac. In a recent Lancet article in 2013, CV risk with use of diclofenac and etoricoxib was assessed in osteoarthritis and rheumatoid arthritis patients. It was found that rates of thrombotic CV events were similar between etoricoxib and diclofenac group. In a BMJ study, etoricoxib and diclofenac have been associated with high risk of CV death, 4.07 RR (relative risk) with etoricoxib and 3.98 RR with diclofenac. In another systematic review of population-based controlled observational studies, the highest overall cardiovascular risk profile was seen with rofecoxib and diclofenac. Piroxicam, on the other hand with an RR of 1.06, and naproxen (RR of 0.97) had low cardiovascular risk profile.

One of the hypotheses for difference in CV risk among NSAIDs is the degree of COX 2 selectivity. Selective COX 2 inhibition results in inhibition of PGI2 (Prostacyclin) production, whereas, more TXA2 (Thromboxane A2) is generated through uninhibited COX 1 pathway. As TXA2 causes platelet aggregation and vasoconstriction, there is an increased risk of CV events. Among tNSAIDs, the degree of COX 2 selectivity varies with diclofenac and acceclofenac being more COX 2 selective than piroxicam (Figure 4). NSAIDs like piroxicam provide balanced COX inhibition (both COX 1 and COX 2) and therefore may have a safer CV risk profile.

Therefore, although NSAIDs increase vascular risks, the size of these risks can be predicted, which could help guide clinical decision making, especially in patients of back pain who frequently suffer from co-morbid conditions like hypertension, heart failure and diabetes.

- 3rd step - to be followed with high dose tramadol or narcotic like morphine or fentanyl or buprenorphine for VAS 9-10 for the patients not responding to 2nd step. Patient with severe back pain might need bed rest for few days.

- Adjuvant like Pregabalin or Amitriptyline or Gabapentin could is added if one is considering back pain to be of neuropathic origin or it is a chronic back pain condition. Any of the above medications could be started with lower dose in the night and gradually in 5-7 days; dosage could be increased to build up the levels of these medications. It is usually effective in chronic back pain conditions. Once it is started, it should be continued at least for 4-6 weeks to assess therapeutic benefit and gradually withdrawn over 1-2 week to prevent withdrawal symptoms.

- Supportive medications like calcium, vitamin D3 or vitamin B 12 could be started only if their blood levels are on the lower side for 3-6 months at least.

- Short burst dose of oral or injectable steroid would be useful only if patient has prolapsed intervertebral disc but not in patients with IDD
or Facet joint syndrome.

- It is useful to keep one stand-by analgesic if patient’s pain suddenly increases due to certain movements or even spontaneously. A fast soluble medication or a sublingual medication could be more useful for control of breakthrough pain (sudden onset of pain). Paracetamol or NSAID could be useful if not contraindicated.

If patient has to be given analgesic for long term in chronic back pain then switching to Paracetamol or Tramadol with adjunct like amitriptyline or Pregabalin or Gabapentin could be useful. For acute on chronic back pain a short burst dose of NSAID for 5-7 days might be used whenever needed. One needs to keep a check on patient’s renal profile and take care of cardiovascular and gastrointestinal safety.

If patient is put on psychotropic medication by psychiatrist then drug interaction with medications like amitriptyline or nortriptyline or gabapentin or pregabalin should be looked for. A lower dose of these medications is advisable. Pregabalin has an advantage as it has negligible metabolism and has no plasma protein binding. As a result, it has no pharmacokinetic drug interaction.

**Adjuvant Modalities (Physiotherapy/Psychotherapy/Meditation)**

Although it is mentioned as adjuvant if followed by patient properly this could be the only modality that patient might need to help his or her pain.\(^{19}\)

**Physiotherapy:** It forms one of the most important parts of patient’s treatment.\(^8,10\) Medications and interventions etc are mainly used to decrease the pain so as to improve the efficiency of patient’s mobility. This increases the flexibility of patient, improves muscle strength and improves the health of patient’s spine. This should be always done along with medication or intervention and even after finishing physical modalities like IFT or Ultrasound; exercises should be continued for life if possible. Any exercise causing severe pain should not be done. Physiotherapist is the best judge of what schedule of exercise would suit the patient.

**Psychotherapy:** If there is any yellow sign of back pain present or it is becoming a chronic back pain then taking help of a psychotherapist or counsellor is usually very useful.\(^{17}\) They are in a much better position to understand patient’s psychological need which is aggravating or producing pain. They could also assist patient in group therapy or cognitive behavioural therapy which is very useful proven therapies in chronic back pain patients.

**Meditation:** Meditation or yoga has a huge importance in the treatment of back pain. It decreases the overall mental and physical stress of the patient if done on a regular basis over a period of minimum 4-6 weeks. Along with exercises, meditation should be done for life to maintain a good physical and mental condition of the patient to prevent recurrence of back pain.

If the patient doesn’t respond to medical line of management then diagnostic pain intervention by a pain specialist could be handy to identify the pain generator in back pain and treatment of the patient could be initiated as soon as possible.

**Interventional Pain Procedures**

These are percutaneous procedures done under image guidance like C-arm (Figure 5) or CT scan to deliver the diagnostic or therapeutic modality like local anaesthetic or steroid or Radiofrequency ablation to Nerve root or Facet joint of the spine. This helps in finding pain generator and also is therapeutic most of the time to relieve pain of the patient immediately for quick rehabilitation.\(^{20}\) It also helps surgeons to decide about the level of spine surgery especially if patient has multiple level disc problems. There are even advanced pain procedures like spinal cord stimulator or intrathecal pump which could be used in patients with resistant back pain of post spine surgery.

Commonly done interventional pain procedures are

- Lumbar/Cervical Transforaminal or Epidural block
- Lumbar/Cervical Facet joint or Medial branch block with or without Radiofrequency ablation
- Caudal epidural block
- Trigger point injection/Piriformis injection
- Lumbar/Cervical sympathetic block
- In advanced cases as mentioned spinal cord stimulator or Intrathecal pump

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**Fig. 5:** Showing the way Interventional pain procedures are done, in this case lumbar median branch block
Surgery

Most patients with back pain do not need surgery, in fact less than 1% patients with resistant back pain may need surgery but patient with neuro deficit will need surgical intervention. Surgery might be simple decompression to complicated fusion or newer implants. Endoscopic spine surgery is also slowly gaining popularity but indications are few. Surgery comes with its own set of problems so it should be reserved as last option in back pain.

Conclusion

Back pain should be dealt with carefully. Sometimes the aetiological factor may not be present to explain the back pain; it is common to consider a psychological component in these patients. This makes treatment all the more difficult and the chronicity of pain leads to depression which can cause further increase in pain. So the pain cycle of physical pain and psychological persistence cause pain to become chronic and difficult to treat. Physicians need to be sympathetic towards their pain and counsel the patients appropriately. The important goal is to break the pain cycle and allow rehabilitation to make the patient comfortable in the long term.

References

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