Stenosis
Stenosis is defined as a narrowing or constriction of a passage or canal.

The three structures that contribute to vertebral canal stenosis are the ligamentum flavum, facet joints and disc space. This intra-segmental degenerative "napkin-ring" concept depends on four factors, alone or in combination, that play a role in narrowing of the spinal canal:

1. Congenital/developmental narrowing of the spinal canal
2. Shape of the canal
3. Acquired changes such as degeneration or fracture
4. Inter-segmental subluxation/instability

Degenerative changes can affect the disc, soft-tissue supports and the facet joints. Annular bulging, ligamentum flavum infolding or hypertrophy and facet joint osteophyte formation encroach on the spinal canal and intervertebral foramina.

The ligamentum flavum changes include loss of elastin fibers, hypertrophy of collagen fibers, fragmentation and infolding of the ligamentum, edema and substance deposit. Obviously, narrowing of the spinal canal constricts the dura and cauda equina nerves. The nerve roots themselves are constricted and often become adherent to the arachnoid with varying degrees of degeneration and demyelination with regeneration of nerve tissue.

Tandem Stenosis
This is a term introduced to describe a patient with cervical as well as lumbar canal stenosis. The cervical stenotic lesion causes cord compression or myelopathy, which in the lower limbs give upper motor neuron (UMN) symptoms and signs. The lumbar stenosis causes nerve root compression and, therefore, lower motor neuron (LMN) lesion symptoms and signs. This causes a mixed neurological picture in the lower extremities. Patients may have hyper-reflexic knee jerks, whilst ankle jerks may be absent.

Imaging
Plain Radiographs
Plain radiographic films of most patients with low back pain are routinely ordered but yield little information about a patient with stenotic spinal canal (SSC) except to show vertebral subluxations. Their greatest use is to rule out other conditions such as tumors or infection. Radiographic films reveal the degenerative changes within the disc space and the facet joints, with osteophytic formation. Subluxations are also obvious on plain radiographic films. The only plain radiographic observation suggestive of a stenotic spinal canal is a narrowing of the inter-laminar space and/or short pedicles.

Myelography
Myelography has been the gold standard for the investigation of a patient with SSC. It is advisable to combine myelography with CT scanning while the contrast material is still present in the subarachnoid space. The myelographic block of SSC is typical and described as either single or multiple levels. An incomplete obstruction is described as having an apple-core appearance and a complete obstruction as having a paintbrush appearance. These two changes are to be distinguished from the meniscal-like change that occurs with tumors of the spinal canal.

CT/Myelography
CT/myelography has largely supplanted plain myelography in most centers. CT scanning is usually performed from the mid-body of L3 to the sacrum. Any disease above this level will not be demonstrated by CT scanning, making it essential for the clinician to predetermine the levels to be scanned. The added benefit of myelographic contrast material with CT will outline the true nature of the spinal canal below the level of the stenotic obstruction.

With the addition of myelographic views taken with the patient in erect and bending positions, functional (non-fixed) stenosis may become evident.

Magnetic Resonance Imaging

MRI is used increasingly for imaging in SSC. In fact, in most situations except for a scoliotic patient with stenosis, it is superior to any other form of investigation. It is non-invasive, involves no radiation exposure and provides several views in different planes.