

The Medico-Legal Aspect of Low Back Pain

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PREFACE

The author realizes in writing this paper that there is a great variance of opinion as to the role of both the degenerated and the ruptured disc in the cause of low back pain. The opinions expressed in this paper are those of the author as well as those of the men who have written the articles listed in the bibliography. The trend of orthopedic literature during the past ten years has been along the thoughts of these internationally famous authors and if the reader doubts the validity of the statement that such a high percentage of back pain is caused by disc pathology, I would suggest that he read these articles.

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Because low back pain is one of the most common afflictions of mankind it necessitates frequent appearances of the orthopaedic surgeon in court as an expert witness. For this reason, this discussion will be limited to pain of the low back region.

As a result of modern conveniences identified with the American way of life, extensive industrialization, and an increase in all means of transportation, the incidence of back complaints and injuries has increased considerably during the past two decades.

During the past ten years the majority of authorities have changed their concept of low back pain and its causes and have completely eliminated such diagnoses as lumbago, sacro-iliac and lumbosacral strain. It is now the consensus of opinion among such well-known authorities as Doctors MacNab, Harris, Key, Kimberley, Caldwell, Shutkin as well as many others, that, percentage-wise, the intervertebral disc is involved in the large majority of cases of idiopathic low back pain. These men feel that the intervertebral disc is involved in approximately seventy-five percent of the cases of all low back pain, and they divide the pathology into degenerated lumbar discs and ruptured intervertebral discs.

To understand the etiology and pathology of low back pain, one must review briefly the anatomy of the low back region. The vertebral column in the low back region is made up normally of five lumbar vertebrae connected through the lumbosacral joint with the sacrum. The vertebral bodies of the lumbar vertebrae are separated by cartilaginous cushions which have a rubber-like consistency. Attached posteriorly to each vertebral body is a signet-

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like ring of bone comprising the laminae, the transverse processes and the spinous processes as well as the very important posterior articulations called facets. Through the series of these rings, the termination of the spinal cord which is called the cauda equina runs distally from the level of the second lumbar vertebra down into the sacrum and opposite each intervertebral disc, a nerve root bilaterally is given off into a foramen or opening into the musculature at the side of the spine. These nerve roots then collect over the anterior aspect of the sacrum and comprise the sciatic nerves bilaterally. These sciatic nerves then run down the legs to supply the muscles of both lower extremities as well as the sensation nerves of both lower extremities. Doctor Roger Anderson has written that the main difference between the joints of the spine and other joints of the body is their close proximity to these nerve roots so that any injury to the bones or joints, or any disease of these bones or joints causes symptoms of a neurological nature. Also, in considering the anatomy of the back, one must keep in mind that the vertebral bodies and joints are supported by a mass of muscles and ligaments and that any weakening or atrophy of these muscles or ligaments has a secondary effect on the vertebral body, the intervertebral disc and the posterior articulations called facets.

Since most cases of low back pain are from either a ruptured intervertebral disc or a degenerated intervertebral disc, let us consider the predisposing causes of these two conditions. It is a well-known fact that certain families have weak intervertebral discs and the members of these families tend to injure their backs easily and also, tend to have a more rapid rate of degeneration of their intervertebral discs. The incidence of disc pathology is also greater among people from twenty to fifty years of age and is more common in the male than in the female because the male is more subject to trauma.

Although both the ruptured intervertebral disc and the degenerated intervertebral disc are, in reality, tissue pathology of the same structure, they will be discussed separately because they manifest themselves by different symptoms and are treated in a different manner. Most disc pathology occurs in the last two joints of the spine, between the fourth and fifth lumbar vertebrae and between the fifth lumbar vertebra and the sacrum. These two joints constitute ninety-six percent of the pathology in intervertebral disc disease or injury. About two percent is found between the third and fourth lumbar vertebrae and only two percent in the remaining portion of the dorsal and lumbar spine. Doctor J. R. Armstrong in London, England, Doctors Harris and MacNab in Toronto, Canada and Shutkin in the United States, along with

many others, feel that several factors work together to cause the degeneration of a lumbar disc. These factors are the familial incidence as mentioned before, repeated minor trauma to the spine or any one severe trauma to the low back region. Thus, trauma can either precipitate a degeneration of a lower lumbar disc or be an aggravating factor in a pre-existing degenerated lumbar disc in the low back region. As this disc degenerates, the vertebral bodies settle so that they move closer together and, frequently, because of the inclined plane of the posterior articulation, the uppermost vertebral body will move posteriorly on the lower vertebral body or sacrum, thus causing an incongruity or telescoping of these posterior articulations referred to as facets. Along with this telescoping or incongruity of the facets, the lowermost facet then moves up into an abnormal position protruding into the foramen or opening between the vertebral bodies where the nerve root emerges, and because of this, there may be nerve root compression. Accompanying the incongruity and telescoping of the facets, there is abnormal wearing of the articulations of the facets which leads to traumatic arthritis of these joints which in turn causes edema or swelling about these joints resulting in additional nerve compression due to the close proximity of the joints to the nerve roots.

The following is a typical history, physical examination and x-ray examination as found on a patient with a degenerated lower lumbar disc. A person usually between the ages of twenty to fifty more likely to be a male than a female presents himself to the physician and gives a history of having an insidious onset of low back pain after minimal repeated trauma or, an acute onset after a more severe type of trauma. Following this onset of pain, they have found that any increased activity increases the low back pain. Frequently the patient will have a radiation of pain down the posterior aspect of both thighs, usually as far as the knees, and this pain is relieved by heat and rest and aggravated by activity. Examination of such a person reveals a flattening out of the normal curve of the lower lumbar region, limitation of motion of the lumbar spine in all directions, tenderness over the lower lumbar region as well as tenderness in the region of the buttocks, which may be bilateral, and there may be bilateral posterior thigh tenderness. Forced flexion of either hip so that the thigh is flexed on the abdomen moves the lumbosacral articulation and the lower lumbar articulations and causes pain in this region. Also, flexion, abduction and external rotation of the hip joints causes a positive sign of pain in the lower spine region similar to the above described test of flexion of the thigh on the abdomen. Both legs are found to be neurologically negative in contrast to what is found in regard to neurological changes in the legs when a patient has a ruptured

disc. By being neurologically negative, one means that the reflexes are normal, and there is normal sensation of both lower extremities. The x-rays of a degenerated disc with back pain would probably reveal a narrowing of either the next to the last or the last intervertebral disc space, a displacement posteriorly of the upper vertebra posteriorly on the lower vertebra or, in the case of the last, posteriorly on the sacrum. Oblique views would show a telescoping or subluxation of the facets of the level of the disease as well as sclerosis of these facets.

The treatment of this condition in its acute phase consists of complete bed rest with the spine in a flexed position and traction of approximately five pounds on both lower extremities, as well as sedation for pain. After the acute phase has subsided, the patient is allowed to be ambulatory and some form of external support such as a chair back brace or a lumbosacral belt with rigid steel stays is prescribed. After all symptoms of pain have subsided, the patient is placed on a gradually increasing regime of muscle building exercises, such as the Williams exercises or a gradual increase in normal exercises, such as swimming, in an effort to build up the recti muscles of the abdomen, the gluteal muscles of the buttocks, the hamstring muscles of the thighs and the erector spinae group of muscles of the low back region. In some severe or persistent cases of pain in the low back region due to a degenerated lower lumbar disc, a distraction type spinal fusion will sometimes be necessary. This is a bone grafting operation of fixing one vertebra to the other while held distracted, thus opening the foramen or opening for the nerve root.

A true, ruptured, lower, lumbar, intervertebral disc is usually a bulging or herniation of the posterior lateral aspect of the intervertebral disc so that it protrudes and presses on one or more nerve roots. Thus, the nerve root pressure is a primary compression of the diseased tissue itself, rather than a secondary compression as found in a degenerated disc when the vertebral bodies move together causing a telescoping of the facets and a closing down of the foramen on the nerve root. This primary compression, or ruptured disc, might be compared to a blow-out on an automobile tire in that when it is observed surgically, there is found to be a bulging out posteriorly, or posteriorly laterally of the actual disc tissue. Many times the nerve root involved is found to be inflamed and stretched tightly over the bulging protruded disc. It is the opinion of Doctor J. Albert Key, the Campbell Clinic, and of other authorities, too, that minor ruptures of intervertebral discs are probably the most common cause of low back pain without leg radiation, for disc tissue itself, has a nerve supply and when the disc is torn and stretched only a slight degree it registers pain only in the back.

Then, as the protrusion increases and there is pressure on a nerve root, the pain begins to radiate down the leg.

The following is the typical history, physical examination and x-ray examination which one might expect to find on a patient with a ruptured intervertebral disc. This patient is more likely to be a male, usually between the ages of twenty to fifty. He gives a history of having experienced several sub-acute attacks of low back pain brought on by trauma; each attack becomes more severe than the last. Usually, as the attacks progress, there will be more radiation of pain to the leg. However, a patient might give a history of severe trauma causing an acute onset of excruciating low back pain accompanied by pain radiating down one or both legs extending sometimes as far as the toes. This pain is of a burning, electrical-like nature, and is often described by the patient as being similar to the sensation experienced when a dentist injects a nerve to deaden a tooth. The pain from an acute, ruptured, intervertebral disc is usually so severe and incapacitating that it is necessary for the patient to be completely immobile for a period of days or weeks. It is typical for this type of disc pain to be periodic, and the patient may become symptom free for days or weeks at a time only to have a recurrence of the pain at a later date. For this reason the same individual may be examined by two competent orthopedic surgeons on different dates with varying physical findings, a fact which is difficult for attorneys and jurists to understand. A patient with a typical, ruptured, intervertebral disc also gives a history of a listing of the spine in the lumbar region to one side or the other. This list may be to either side. However, it is more likely to be to the opposite side from which the pain radiates into the leg. The patient also usually notices that coughing, sneezing and straining at stool causes a severe radiation of pain down the leg, and he will notice areas of numbness over typical, neurological anatomical patterns down the leg. Also, he may notice a weakness, or giving out sensation, of the leg particularly when he is fatigued. Lifting, bending, stooping, standing and riding in an automobile, as well as any other excessive activity, seems to cause an exacerbation of the symptoms of an acute, ruptured intervertebral disc. Examination usually reveals a patient in a marked degree of distress, holding his back still, and walking with a limp. A loss of the normal lumbar lordosis will usually be found, so that the lower, lumbar spine region is completely flattened out, and when requested to bend forward, he leans like a straight stick. Many times the list of the spine will be quite noticeable so that the patient leans forward and to one side as he walks. In fact, there is a common saying among orthopedists that if a patient has a list, he has a disc. Further examination of the spine reveals marked muscle spasm,

and marked limitation of motion of the spine usually in all directions, but particularly toward the side of the leg pain. Frequently, quite severe lumbosacral tenderness is found, or tenderness over the involved disc. There is tenderness in the buttocks region on the side involved and tenderness over the posterior aspect of the thigh and calf on the side involved. When the patient's outstretched leg on the bad side is raised by the physician, it will cause a severe radiation of pain down over the nerve root involved often as far as the heel or foot. The ankle reflex on the side involved is commonly found to be reduced, particularly if the interspace involved is between the last lumbar vertebra and the sacrum. Sometimes it is found that the knee reflex is reduced, particularly if the interspace involved is between the third and fourth lumbar vertebrae or between the fourth and fifth lumbar vertebrae. Commonly, the physician is able to map out a typical nerve root pattern, the most common being the first sacral nerve root which supplies the sensation to the outer aspect of the lower calf and the outer aspect of the foot, usually involving the last two or three toes. Frequently, the fifth nerve root is involved and this nerve root supplies the anterior aspect of the lower leg and the dorsal aspect of the foot into the large toe of the foot. Since between five and fifteen percent of ruptured discs may be multiple, or involving two discs, both of these nerve root patterns are, at times, found to be deficient. X-rays usually reveal a list of the lumbar spine, a loss of the normal curve of the lumbar spine on the lateral view, and if the ruptured disc is of long standing, some narrowing of the interspace involved is noted. However, if it is a new ruptured intervertebral disc, there will likely be no narrowing of the interspace, and many times such x-rays are read as negative. These films could be reported negative in spite of the fact that the patient has a true ruptured intervertebral disc clinically. About eighty percent of the cases of ruptured, intervertebral discs can be demonstrated by the special technique of a myelogram which is an injection of pantopaque, an iodized oil, into the spinal canal through a lumbar puncture needle, following which the patient is studied by fluoroscopy and repeated x-ray films are made on an x-ray table which is tilted back and forth. The iodized oil runs like quicksilver up and down the spinal canal and when it comes to an area of a ruptured intervertebral disc, it is unable to pass by and it detours thus causing a filling defect. This makes it possible to determine that some object is present at that level which obstructs the normal flow of the pantopaque. It must be kept in mind, however, that about twenty percent of all myelograms are negative in spite of the fact that there is a definite ruptured intervertebral disc, and that a negative myelogram does not mean that the patient does not have

a ruptured disc nor, if he is sick enough, that he should not be subjected to an operation.

Most orthopedic surgeons have found that attorneys, juries, insurance companies and the State Industrial Commission rely too heavily on myelograms for diagnosis of a ruptured intervertebral disc, and not sufficiently on the clinical findings and histories of such a condition. Many times a very sick person, because of a negative myelogram, may receive neither proper medical attention nor a fair verdict by jury.

Eighty to ninety percent of the cases of ruptured intervertebral discs can be treated conservatively, that is without any form of surgery. This conservative therapy consists of complete bed rest for several weeks, infrared bakes and massage to the low back region three times a day, muscle relaxing drugs such as Tolserol and Curare, and traction to the legs in an effort to distract or pull apart the vertebral bodies so that the protruding intervertebral disc will flatten out and cause less nerve compression. After several weeks of conservative therapy, the patient should gradually be made ambulatory in a well fitting external support such as a chair back brace or a lumbosacral belt with rigid steel stays. If the patient becomes symptom free after wearing a brace or corset for several months, he will, as in the case of the degenerated disc, be placed on a regime of Williams exercises, or a gradual increase in normal exercise, such as swimming, in an effort to build up his musculature. Following this, the external support should be removed if possible.

It should be remembered that a person with a true history of a ruptured intervertebral disc has a permanent disability in spite of the fact that he may become symptom free because, even if the disc heals with scarring, it is potentially weak and is very likely to be re-injured.

If conservative therapy fails after several weeks, or the patient has repeated acute episodes of very incapacitating attacks from his ruptured intervertebral disc, or if, as is found in two percent of the cases, he begins to have paralysis of one or both legs, he must then submit to a laminectomy. A laminectomy is the surgical removal of the protruding ruptured intervertebral disc. It must be kept in mind however, that this operation is far from one hundred percent successful in regard to curing all patients. It is an established fact that such surgery cures only about fifty-five or sixty percent of the cases. However, it will improve about ninety-two percent of the cases. Several factors determine whether a patient should have just a laminectomy or a spinal fusion along with a laminectomy. If the patient has no evidence of a telescoping of the articulations as mentioned in the degenerated disc, no trau-

matic arthritis of the articulations, and no narrowing of the disc space and he does not have to perform heavy labor, it would probably be wise to do only a laminectomy. If the patient has any one of the aforementioned pathological conditions, or does heavy labor, or if, at the time of surgery, it is found that his spine is very unstable, then a spinal fusion of the distraction-type is indicated in an effort to prevent a telescoping and incongruity of the posterior articulations and secondary nerve compression in the nerve root opening or foramen due to these degenerative changes of the posterior articulations. Even after a rather successful laminectomy, or laminectomy and spinal fusion, it is frequently necessary for the patient to change his occupation if he does heavy work, for it is the author's opinion that in spite of successful surgery, there is usually some residual disability after a disc operation. This permanent disability can be lessened as the years pass by a regime of graduated muscle building exercises to strengthen the abdominal muscles, the back muscles, the buttocks muscles and the leg muscles. Because of this fact, many patients will benefit from the rehabilitation program which is being conducted by the Ohio State Industrial Commission at the Rehabilitation Center at The Ohio State University, Columbus, Ohio.

Although degenerated discs and ruptured discs constitute a large majority of the causes of low back pain, there are other causes of low back pain which will be discussed very briefly as it is not within the realm of this paper to dwell too deeply into the many causes of back symptoms. Of the remaining causes, the most common is hypertrophic arthritis. This is most frequently found in patients after the age of fifty who do laboring work. It manifests itself by stiffness of the low back region, pain in the low back region and often, pain around onto the abdomen and down into the thighs. These symptoms are aggravated by activity and are more acute in damp, cold weather. X-rays of a patient with this condition reveal multiple spurs of bone lipping over the edge of the bones much as tallow on a candle. The treatment of this condition consists of heat, rest, salicylate medication and a chair back brace or a lumbosacral belt with rigid steel stays.

The least common type or rheumatoid arthritis of the spine goes under the name of Marie Strumpel arthritis. This disease is a constitutional disease as are other forms of rheumatoid arthritis, and it is usually found in the younger age group. These patients have the typical poker-back spine, a limitation of expansion of the chest which is one of the first objective findings in this condition, and on x-ray are found to have first a sclerosis of the sacro-iliac joints then later, a sclerosis of the facets starting at the bottom and climbing up the spine. Complete bridging together of the

vertebral bodies is the end result of this condition. Treatment of this condition is primarily a medical problem as the constitutional symptoms of rheumatoid arthritis are treated with cortisone, salicylate medication, gold therapy and blood transfusions. The local treatment consists of x-ray therapy along with a Taylor back brace. The Taylor back brace prevents curving forward of the spine into a humpback position.

Another condition which causes definite low back pain is spondylolisthesis, although this condition is not too common. At present, this is thought to be a birth injury resulting in a fibrous union, instead of the normal bony union, in the posterior elements of the lower lumbar spine at the level involved. In this condition there is a slipping forward of the upper vertebra on the lower one since they are not held together by the bony structures of the posterior elements present in a normal spine. The symptoms of this condition consist of low back pain with radiation of pain down one or both legs, a step-off deformity at the lumbosacral level posteriorly and a closer than normal approximation of the lower ribs to the pelvic bones bilaterally. The most important factor is a positive x-ray of the defect in the posterior elements of the vertebrae so that the upper vertebra slips forward on the lower vertebra in varying degrees. The treatment of this condition is muscle building exercise and a chair back brace. If this conservative therapy is unsuccessful then, following the method of Doctors Gill, Mannering, and White, a complete excision of the posterior elements of the involved vertebra with a freeing of the nerve roots at that level is carried out with, or without bone grafting of the vertebral bodies.

Another cause of low back pain is congenital defects such as asymmetrical facets, congenital absence of facets, transitional fifth lumbar vertebrae or first sacral segments, hemivertebra, and spina bifida. Each of these conditions are diagnosed by x-ray, and each treated according to the magnitude of the symptoms either by conservative methods as aforementioned or surgical methods such as by a spinal fusion.

Acute bacterial infections such as tuberculosis, brucellosis, and common osteomyelitis of a progenic organism as well as benign bone tumors such as an osteoid osteoma, hemangioma, osteochondroma and, of course, malignancies, either primary or metastatic, must always be considered in making a diagnosis in a case of low back pain. The symptoms of these conditions are usually of increased magnitude as compared to the more common conditions causing low back pain. Each of these conditions must be treated separately. However, it is not within the realm of this brief paper to discuss each type of treatment.

Another not too infrequent cause of low back pain is pain on a basis of disease of the visceral abdominal organs such as gallbladder pathology, bowel pathology, genito-urinary pathology and pelvic pathology. These conditions cause pain of a referred nature and it is often referred to the low back region. Of course, the treatment of this low back pain depends on eradication of the disease of the visceral organ.

Another condition occasionally seen in the low back is senile osteoporosis. As the name indicates, this is a condition of the aged which occurs when the sex glands fail to produce the hormone secretions which the body needs to keep the bones hard and firm. These bones then fracture easily, and one often sees multiple fractures of the spine accompanied by severe pain with secondary radiculitis of nerve pain around the body. This condition is treated, with good results, by supplying sex hormone secretion artificially, and wearing a chair back brace.

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