THE COMMONEST LUMBAR DISC – L.3!

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A very large proportion of patients referred to my Department of Physical Medicine from General Practitioners, Medical and Surgical colleagues, complain of low back pain with or without leg signs and symptoms. This has commonly been attributed to sciatica. More and more, however, I came to think that some hitherto unsuspected factor was involved.

In the period of less than two years I examined 500 such patients. Only those suffering from pain in the sciatic nerve or femoral nerve distribution, or both, were included in the series. Fractures, infection, metabolic, congenital anomalies, new growth, and hysteria were excluded.

The Production of Symptoms — Signs and symptoms with a lumbar disc lesion are referred in the main to the low back and to one or both legs. The clinical findings associated with a disc lesion and referred to the low back, are pain, muscle spasm, abnormalities of posture, and disturbances of spinal movements.

Symptoms — Patients with an L.3 disc lesion complained of acute or chronic backache with a feeling of heaviness in front of the thighs, groin discomfort, pain down the outer side of the thigh, and occasionally down the front of the shin as far as the ankle joint.

Signs — In the case of a patient standing with no sciatic syndrome involving L.5 or S.1 nerve roots, ventriflextion of the lumbar spine was usually 80-90°; but extension, lateral flexion, and oblique lateral flexion to the affected side were always limited and painful. In most patients, lateral flexion and oblique lateral flexion to the sound side were limited by taut muscles on the opposite side, giving a pulling sensation rather than a compression feeling in the affected area of the low back.

The 4th lumbar nerve root, part of the Superior Gluteal nerve supplies the Gluteus Medius, Gluteus Minimus and Tensor Fasciae Latae muscles. It also occurs in the femoral nerve to the Quadriceps i.e. Rectus Femoris, Vastus Lateralis, Vastus Intermedius and Vastus Medialis muscles. It continues in the Anterior Tibial nerve to the Tibialis Anterior muscle. It is concerned in extension, rotation and abduction of the hip joint, extension of the knee joint, dorsiflexion of the ankle joint, and inversion of the forefoot.

In the lumbar spine, about 15% of the patients did

not feel any local tenderness on palpation. The others did appreciate pain between L.V.3/4 on pressure over the supraspinous ligament, and more pain on deeper palpation over the transverse process area on the affected side. Frequently the erector spinae muscle was prominent with a scoliosis, convex to the affected side, opposite the L.3 disc. On performing medial rotation with both the straight leg and the hip flexed to 90° in the supine position the movement was very limited and approximately of the same range. Full abduction of the hip joint on the affected side was possible except in the odd patient suffering from arthrosis of the hip on the same side.

Still in the supine position, rotation of the lumbar spine with the thigh flexed to 90° or less, was more limited towards the affected side in contrast to the opposite limb in lateral and/or oblique lateral compression on the affected side with the patient standing. In the case of the lower limb reflexes 499 patients out of the series of 500 showed the knee jerks to be easily elicited and many of these were exaggerated. Only one female, aged 66 revealed a depressed knee jerk on the affected side. She appeared to have the signs and symptoms of a combined lesion at L.3 and L.4 disc levels. Quite commonly the knee jerks on both sides showed hyper-reflexia.

In the prone position, moving the heel toward the buttock was always painful and limited on the affected side due to femoral nerve stretch pain, similar to Lasegue's sign with the L.5 or S.1 nerve root lesion.

In my experience very few X-ray reports did confirm disc narrowing at Lumbar 3 level although most showed flattening of the lumbar lordosis and a scoliosis convex to the affected side opposite the L.3 disc space, this being the maximum point in the convexity.

It is interesting from the mechanical side to note that the disc space between the 3rd and 4th lumbar vertebrae has the least inclination from a plane perpendicular to the line of gravity and, therefore, is the most likely to show the effects of compression. In the highly curved spine the tendency of this interspace to be under pure compression is accentuated because of the increased inclinations of the joints above and below it.

Little is mentioned in the current literature regarding signs and symptoms and general treatment of 1st, 2nd

Fig. 1 Antero-posterior view of the lumbar spine; the convexity is to the affected side at the level of the 3rd lumbar disc. The edges of the 3rd and 4th vertebrae show osteophyte formation.

and 3rd lumbar intervertebral discs. There are on the other hand many references to the common herniated lumbar discs that occur at the 4th and 5th lumbar interspace with compression of the 5th lumbar and 1st sacral nerve roots.

According to Aronson and Dunsmore, the occurrence

Fig. 2 Lateral view of the lumbar spine, showing the angulation of the 3rd lumbar disc to the line of gravity, indicated by the dotted line.

of herniation of an upper lumbar disc in 5% of patients in their series suggest that a significant portion of patients suffer from this lesion in an area hitherto claimed to be practically free of herniations.

The site of lumbar disc lesions. In 1951 J. E. A. O'Connell reported the following frequencies:-

L.5 – S.1 disc lesion	49.6%
L.4/5 disc lesion	39.6%
L.2/3 – L.3/4 disc lesion	1.6%
Double lesions	9.2%

Armstrong's figures in 1,000 consecutive cases in which findings were confirmed as operation are shown below:-

L.5 – S.1	468 (46.8%)
L.4 – L.5	404 (40.4%)
L.1, L.2 and L.3 Disc Lesions	21 (2.1%)
Double Lesions	107 (10.7%)

More recently Dr. James Cyriax has stated that lesions of the lumbar discs are almost unknown at the 1st and 2nd lumbar, some 5% occur at the 3rd level, remainder lie at the 4th and 5th slightly more often at the 4th.

Aronson and Dunsmore, 1395 consecutive operations for lumbar discs, 73 lesions of the upper three discs were found:-

Upper 3 Lumbar Discs	73 in 1395 5.2%
L.1 – L.2	4 in 1395 0.29%
L.2 – L.3	18 in 1395 1.46%
L.3 – L.4	51 in 1395 3.72%

J. Crawford Adams states that L.5-S.1 and L.4-5 are those most affected. L.3-4 leads to impaired or absent knee jerk, the pain radiates to the front of the thigh or groin. Macey reported 8% surgically verified at L.3, Love and Walsh 10% in 500 patients at L.1, 2 and 3 levels and Baker 5% at upper levels.

According to Brain's Clinical Neurology 3rd edition revised by Roger Bannister, most Lumbar Discs occur between 4th and 5th and L.5-S.1 with a relative frequency of 2 to 3. If 4th root is involved knee jerks may be diminished. In contrast, in the present series only one patient had a very diminished knee jerk and the remainder either had a normal response or in many instances hyper-reflexia was recorded.

Again according to Brain, the age group stated that 75% of patients are in or beyond the 4th decade. In the Royal Victoria Hospital Series, see Table I, were almost 50%, i.e. 231 in the first three decades against 269 between the 4th and 8th decades inclusive.

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456 patients in this series were manipulated without an anaesthetic and everyone had a resultant increase in medial rotation of the affected leg and improvement of the range of knee flexion in the prone lying position, i.e. the femoral nerve stretch pain was reduced.

In addition many patients received either local U.V.L. to the affected disc area or short-wave diathermy where there was multiple nerve root involvement with marked spasm together with lumbar isometric flexion exercises.

An interesting analogy is to compare the movements of the lumbar spine and leg with a corresponding lesion in the cervical spine involving the shoulder girdle and arm.

It is interesting to compare the movements of the leg against a corresponding lesion in the cervical spine involving the shoulder girdle say in C.5 or C.6 radiculitis. In the upper limb, abduction is reduced with corresponding loss of rotation; in the lower limb with an L.4 nerve root involvement there is loss of medial rotation, a positive femoral nerve stretch pain, and usually full abduction. The knee jerks frequently show hyper-reflexia on testing.

Another interesting feature is that at least 15% of the patients will not admit to any discomfort over the L.3 disc area on the deepest palpation and yet they demonstrate the femoral nerve stretch pain with full abduction and restricted medial rotation. Could this lesion be the phantom low back described by Andrae?

Three pregnant patients suffering from L.3 disc lesions were manipulated successfully at 16, 24 and 37 weeks and a fourth lady was manipulated for the same complaint a week after the birth of her child with relief. Three male patients out of the total gave a history of a disc operation, one aged 35 at L.5 now had an L.3 lesion, the second aged 39 was operated at L.4 disc level, and was now suffering from a femoral neuritis at L.3 disc, and another patient aged 51 had signs and symptoms related to L.4 disc level. His L.5 disc had been removed earlier.

These figures so striking in their variance with clinical literature to date, must lead us to consider the 3rd lumbar disc as an important, perhaps principal cause of acute and chronic backache.

**RETROSPECTIVE STUDY OF 500 PATIENTS AT ROYAL VICTORIA HOSPITAL
SEPTEMBER 1970 – SEPTEMBER 1972**

Table I – Age Groups

	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	TOTAL
Male	6	60	75	68	47	26	4	1	287
Female	4	47	39	50	45	23	5	0	213
		231				269			500

Table II – Sex Involvement

Males	287 = 57.4%
Females	213 = 42.6%
	500

Table III – Femoral Neuritis

L.3	305 = 61%
L.3 & L.4	37 = 7.4%
L.3 & L.5	72 = 14.4%
L.3, L.4 & L.5	45 = 9%
	459 = 91.8%

Table IV – Femoral & Sciatic Neuritis

L.3 & L.4	37 = 7.4%
L.3 & L.5	45 = 9.0%
L.4	16 = 3.2%
L.4 & L.5	6 = 1.2%
L.5	19 = 3.8%
	123 = 24.6%

Table V – Sciatica

L.4	16 = 3.2%
L.4 & L.5	6 = 1.2%
L.5	19 = 3.8%
	41 = 8.2%

REFERENCES

ADAMS, J. CRAWFORD, (1971) Outline of Orthopaedics 7th Edition Churchill Livingstone.

ANDRAE, R. (1929) The 'normal' or symptomless disc protrusion. Über Knorpelknotchen am hintern Ende der Wirbelbandscheiben in Bereich des Spinalkanals. *Beitrz.Path.Anat. V.Z.Allg Path.* 82, 464.

ARMSTRONG, J. R. (1965) Lumbar Disc Lesions, 3rd Edition E. & S. Livingstone Ltd., Edinburgh & London.

ARONSON, H. A., and DUNSMORE, R. H. (1963) Herniated Upper Lumbar Discs. *J.Bone & Joint Surgery* 45A No. 2, 311-317.

BAKER, A. B., (1955) Clinical Neurology Vol. 2 New York Paul B. Hoeber Jnr.

BRADFORD, F. K. & SPURLING, R. G. (1947) The Intervertebral Disc with Special Reference to Rupture of the Annulus Fibrosus with Herniation of the Nucleus Pulposus. Ed. 2 p. 77 Springfield Illinois Charles C. Thomas.

BRAIN, W. R. (1969) Clinical Neurology, 3rd Edition. Revised by Roger Bannister. London, Oxford University Press.

CYRIAX, James. Treatment by Manipulation, Massage and Injection Textbok of Orthopaedic Medicine, Vol. 2 8th Edition. Bailliere Tindall.

FARFAR, H. F., HUBERDEEN, R. M., DUNBAR, H. I. (April 1972) Lumbar I.V. Disc Degeneration. The Influence of Geometrical features on the pattern of disc degeneration – A post-mortem study. *Journal of Bone & Joint Surgery*, 54A, No. 3. Montreal, Quebec, Canada.

LOVE, J. G., and WALSH, M. N., (1940) Intraspinal Protrusion of I.V.D. *Arch.Surg.* 40: 454-484.

MACEY, H. B. (1940) Clinical Aspects of Protruded I.V.D. *Arch.Surg.* 40 433-443.

O'CONNELL, J. E. A., (1951) Protrusion of the Lumbar Intervertebral Discs., *J.Bone Joint Surgery* 33-B

PILLMORE, G. U., (1946) Clinical Radiology, A Correlation of Clinical and Roentgenological Findings. Vol. 2 Philadelphia. F. A. Davis & Co.

SCHMORL, G. (1929) Über Knorpelknotchen an der Hinterfläche der Wirbelbandscheiben, *Fortschr, Roentgenstr*, 40: 629.

VON LUSCHKA, A. (1858) Die Halbgelenke des Menschlichen Korpus G. Reiner Berlin.

OBITUARY

**Brigadier H. L. Glyn Hughes, C.B.E., D.S.O., M.C., Croix de Guerre,
M.R.C.S., L.R.C.P., M.R.C.G.P.**

By the sudden death of Brig. Glyn Hughes, at the age of 81, on November 24th 1973, Britain has been deprived of one of its outstanding doctors in many fields. He qualified at University College Hospital in 1915, saw much war service and was wounded in the first World War. He continued to serve in the Territorial Army between the wars, and in the second World War trained many medical units for active service, was responsible for the care and rehabilitation of the victims of Belsen, and after the war he commanded the R.A.M.C. depot at Crookham, where many doctors who qualified towards or after the end of the war passed through his hands during their national service. After his Service career, he played a prominent part in medical administration during the first decade of the National Health Service, and later in the founding of the Royal College of General Practitioners. He also played a big part in the Medical Council against Alcoholism.

Brig. Glyn Hughes joined B.A.S.M. in 1955, two years after the founding of the Association, and for many years was a most valuable "elder statesman" on the Executive Committee, able to bring in his valuable and most varied experience and knowledge of people and procedure. Although he left the B.A.S.M. in 1967, when he retired from active practice, he kept on a keen interest in sport, especially Rugby football, and we were delighted to see him amongst those present at the B.A.S.M./B.O.A. symposium on Altitude Training on November 21st. Three days later, he died in Edinburgh just after the International at Murrayfield.

We will constantly be reminded of him every time we hear the R.A.M.C. march past to their Corps March, "Heres a health unto his Majesty", chosen as the official march, of course, by their former Inspector, Brigadier Glyn Hughes.

H. E. Robson