Vesical Dysfunction Due to Prolapsed Disc

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Summary

Neural disturbance of micturition may occur as a result of a prolapsed intervertebral disc. Single nerve root lesions are unlikely to cause bladder dysfunction; a massive central protrusion producing total blockage of the vertebral canal or multiple disc lesions are more likely to cause disturbance of voiding. High lesions are more prone to cause severe bladder dysfunction. Vesical dysfunction may sometimes be present without the typical back and leg pain.

Provided a gynaecological cause is excluded, any young or middle-aged woman developing incontinence and retention with a sterile urine must be fully investigated to exclude a disc lesion. Once the disc has been removed, bladder function will improve, but in some cases recovery will be slow. Rarely some patients have permanent bladder dysfunction following a disc operation.

Introduction

Disturbances of bladder function, usually transient but occasionally persistent, may occur after operations for prolapsed intervertebral disc. Such postoperative urinary troubles have become uncommon with improvements in technique, such as the fenestration procedure.¹ Of greater interest, and certainly of greater importance, are neural lesions due to a prolapsed lumbar disc causing bladder symptoms in patients with minimal or absent back or leg pain. This newly recognized clinical entity has been described by Love and Emmett, of the Mayo Clinic.² It has also been reported by Mallock³ and Yaxley⁴ but otherwise has received as little attention as that accorded to the vesical complications and their treatment in multiple sclerosis.⁵⁻⁸ Here we discuss the diagnosis, especially in the difficult "occult" cases, and describe the management of a personal series of 40 cases. It is necessary also to draw attention to a group hitherto largely ignored in which the vesical dysfunction is cured by bed rest and traction.

Probably the usual disc lesion escapes the neural complications of bladder dysfunction as only one root is compressed. Vesical dysfunction is more likely to occur when the annularis is ruptured and the whole vertebral canal is filled by the nuclear mass or when there are multiple disc protrusions. The structure of the intervertebral disc and the morbidity of disc lesions were described by Armstrong.⁷ The annulus is weaker posteriorly and its rupture allows the nucleus pulposus to protrude. Such disc lesions are commonly posterolateral in site, medial or massive central protrusions being less common. Some patients with disc lesions causing bladder dysfunction have been diagnosed as "hysterical" or their symptoms labelled as functional because of minimal physical signs,⁸ and it is probable that the condition is not uncommon.

Classification and Diagnosis

There are three varieties of bladder dysfunction associated with a prolapsed disc. A, temporary—relieved by conservative measures. B, postoperative, occult—insensitive bladder with minimal back or leg signs. C, permanent—(i) bladder function not improved by disc surgery; (ii) no previous bladder dysfunction, bladder dysfunction after surgery for disc.

Difficulties of diagnosis arise especially in the occult type, but certain features are helpful in suggesting the condition and indicating the need for further investigation. As in any other neurological disease the symptoms and signs depend on the level of the lesion. The essential features of a classical prolapsed disc are due to pressure on a nerve root, lumbar lesions being more likely to affect the bladder than protrusions higher up the spinal column. In disc protrusions L4-5 and L5-S1 the first sacral root may be affected with diminution or loss of the ankle jerk; in L2-3, L3-4 the knee jerk may be diminished or absent, the segmental level of the knee jerk being L3 and L4 and the ankle jerk S1 and S2. This radiculopathy leads to (a) spasm of the erector spinae muscles, with pain and limitation of the trunk movements; (b) restriction of hip flexion with the knee extended if the third and fourth lumbar discs are involved (Lasègue's sign); (c) sometimes a scoliosis and a limp; (d) sometimes numbness in the perineum; (e) weakness of the leg muscles, particularly the dorsiflexors of the foot; and (f) absence of the ankle jerk (S1 and S2 roots) and diminution of the knee jerk (L3 and L4 roots).

Many patients with disc prolapse, however, have minimal neurological signs. In a series reported by Young⁸ 68% of patients complained of backache, 24% had sciatica, and 8% complained of both symptoms, but of 470 cases of disc lesions (proved at operation) 39% had no neurological signs. Bladder symptoms may develop synchronously with the back and leg pain, and on talking to the more perceptive patients it often appears that the first evidence of bladder dysfunction is impaired bladder sensation.⁹ Large central lumbar disc protrusions are likely to lead to a lower motor neurone type of bladder affection, whereas protrusions higher up the spinal column may press on the spinal cord and lead to upper motor neurone dysfunction.

Emmett and Love^{10, 11} pointed out certain features particularly suggestive of the occult variety. Most of their patients were obese women who often had a history of childhood enuresis. Sometimes a history of injury was obtained, the injury antedating the start of the urinary symptoms. These preliminary symptoms were present in nearly all patients and consisted of periodic attacks of frequency, nocturia, and urgency without evidence of urinary tract infection. As a rule the attacks increased in severity, eventually leading to incontinence or retention.

A few patients complained of abdominal or loin pain and a mild sacral discomfort. Examination of the upper urinary tract by pyelography showed nothing abnormal, and there is rarely any evidence of calyceal dilatation or back-pressure (even in the presence of a large residual urine), thus resembling the condition of the urinary tract in tabes.

A characteristic feature is that cystoscopy may be carried out without anaesthesia or discomfort. Emmett and Love^{2, 11} pointed out that the pressure of the cystoscope on the trigone failed to cause any pain and that bladder overfilling was not appreciated by the patient.

A cystometrogram in these patients showed that the detrusor action was more or less normal, the dysfunction being mainly due to defective bladder sensation similar to that found in tabes or a severe diabetic neuropathy. Rosomoff and his associates¹²

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confirmed the frequency of abnormal cystometrograms in patients with protruded lumbar discs.

RADIOLOGICAL INVESTIGATIONS

X-ray examination of the lumbosacral spine may show narrowing at the appropriate intervertebral spaces, but other degenerative lesions may be found, such as spondylosis or spondylolisthesis, as they are associated with disc prolapse. In the series investigated by Emmett and Love¹⁰ several congenital abnormalities were found, such as spina bifida occulta, hemivertebra, and widening of the spinal canal in the lumbar region, but these were thought not to be of significance. Gillespie,¹² reviewing 500 x-ray films of patients operated on for disc lesions, found congenital abnormalities in the lumbar-sacral area in 34.2%, while in 500 cases x-rayed for reasons other than back pain the incidence of congenital abnormalities was only 8.8%.

The patients with disc lesions and bladder dysfunction described by Mallock³ and Yaxley⁴ had a complete block shown by myelography, but this was not so in all the cases described by Emmett and Love,^{10 11} who emphasized that in some of their worst cases the myelogram was negative or equivocal and recommended air instead of an opaque contrast medium. Feffer and Rizzoli¹⁴ reported that 40% of clinically significant disc protrusions are not detected by myelography. The reason may be that most disc protrusions are placed laterally, and those most likely to be shown by myelography are medially or centrally placed. Supine views should be taken during myelography to exclude other lesions of the cauda equina—for example, tumour and spinal dysraphism—as well as the standard prone views to show the disc protrusion.

Illustrative Cases

Patients with bladder dysfunction due to a prolapsed disc presenting with either skeletomuscular or urinary tract symptoms may be classified by the scheme described above. The number of cases of each type is shown in the Table.

Distribution of the Three Classifications in the 40 Cases

A	{	Bladder dysfunction of a temporary nature	13
		Transient postoperative symptoms	8
B	{	Occult type with bladder dysfunction and minimal or absent back or leg pain	9
C	{	Permanent bladder dysfunction not relieved by treating the disc lesion	6
		Permanent, developing after disc surgery	4

CASE 1

This patient, a medical practitioner aged 49, had temporary bladder dysfunction. He presented with a four-week history of right sciatica and backache of gradual onset followed by acute severe backache and retention of urine. The right ankle jerk was absent and he had a painful retention which was treated by catheterization. The urine was sterile and he had no previous urinary symptoms. The clinical and radiological signs were those of a disc protrusion at the level of the 4th-5th lumbar vertebrae, though myelography was not performed. At laminectomy a large disc protrusion at this level was found and removed. No other disc lesion was detected. The indwelling catheter was removed on the second postoperative day, when he was able to void normally.

CASE 2

This patient, a 40-year-old-man, had temporary interference with bladder function, and it is of interest that the symptoms were relieved by non-operative treatment. The patient sustained an acute lumbar strain while painting his ceiling at home. He went to bed to relieve the pain and a few hours later found that he could not void. The family practitioner was consulted and was surprised to find that the distended bladder did not cause any pain. X-ray examination showed narrowing of the disc space between the fourth and fifth lumbar vertebrae. The right knee jerk was weak and the right ankle jerk absent. Perianal anaesthesia was present.

A cystometrogram and myelogram were not performed. A total of 600 ml of sterile urine was removed from the bladder by catheterization and the disc protrusion was treated by bed rest and traction. A week later the catheter was removed and he was able to void well. When reviewed six months later micturition was normal without residual urine.

CASE 3

This patient, an obese woman aged 50, had permanent bladder dysfunction not relieved by treating the prolapsed disc. She sustained an acute back strain and developed severe lumbar pain, left sciatica, and an acute retention of urine the next day. The left ankle jerk was absent and the left knee jerk weak with numbness over the left sciatic nerve distribution, and she was unable to dorsiflex her left foot. The urinary retention did not appear to cause much discomfort but catheterization was instituted. She was treated by bed rest and traction and subsequently was able to void. As she still had backache a laminectomy was performed three months later after myelography had shown disc lesions at the fourth-fifth and fifth-first sacral levels. The operation appeared to relieve her backache and she returned to full duties. Six months later, however, she was admitted to another hospital with mild sacral backache and a painless urinary retention. She was unable to void after catheterization and a diagnosis of hysterical urinary retention was made and a urological opinion sought.

An intravenous pyelogram showed that the upper urinary tract was normal. The full bladder contained 800 ml of sterile urine, with a residual urine of 200 ml. The cystometrogram showed that the detrusor was weak, the maximum voiding pressure being 30 cm of water. She had normal knee jerks and the left ankle jerk was very weak. There was complete anaesthesia to pin-prick and touch in the sacral and perianal areas. As the operative surgery to her back had failed to restore bladder function, endoscopic resection of the bladder neck tissue was performed to reduce the outflow resistance. As a result of this she was able to void normally, with satisfactory bladder emptying three days after the resection. When reviewed 18 months later she remained free of symptoms with sterile urine and complete bladder emptying. Resection of the bladder neck was not followed by stress incontinence.

CASE 4

A good example of the occult type is afforded by a woman of 62 who had a prolonged history of frequency and difficulty in voiding, with episodes of retention. She also complained of low back pain but her main complaints were related to the urinary tract. A transurethral resection of the bladder neck had been performed elsewhere without benefit. A myelogram showed multiple lumbar disc protrusions, and at laminectomy discs between L3-4 and L4-5 were removed. The operation was followed by a dramatic improvement in the urinary symptoms, micturition becoming normal.

CASE 5

This patient also had an occult spinal lesion. When aged 45 she developed a temporary bladder dysfunction which was relieved after wearing a spinal support. Since the age of 26 she had had recurrent episodes of frequency without dysuria, the urine remaining sterile. Though she had two children there had been no urinary disorders during the pregnancies. She presented with recurrent episodes of frequency and a history of two episodes of retention with overflow. The limb reflexes and sensation were normal but the anal tone was poor. There was no glycosuria or bacteriuria and no gynaecological lesion was found. The cystometrogram showed a large-capacity insensitive bladder. The pyelogram and renal function were normal and no bladder neck obstruction was found at cystoscopy. X-ray film of the lumbar spine showed pronounced osteoarthritis affecting the disc spaces L3-4, L4-5, and L5-S1.

She was treated with a spinal support and remained symptom-free. At the time of writing she could micturate normally, had no residual urine, and her bladder sensation was normal.

It is necessary to discuss in more detail the 10 patients in category C of the Table, as probably this serious group came under our care because of our connexion with the Regional Paraplegic Centre. These were, moreover, exceptional cases, as is shown by the fact that in eight the disc lesion was situated higher than the usual L4-5 level. Two were cervical, three were

thoracic, and three were at T12-L1. There appears to be evidence that if there are urological complications in the higher lesions the prognosis is worse.

In four patients in this group the urinary symptoms were not relieved by operation, and in the remaining four obstinate retention of urine developed after the laminectomy. To illustrate the seriousness of the neural defect we must mention that in only three was there any evidence of reflex (detrusor) activity on the cystometrogram. These were virtually complete lesions, falling in the category described as "disc paraplegia."¹ As might be expected transurethral resection or division of the external sphincter or both was necessary in all these patients to correct the retention. The residual urine was virtually eliminated in all patients but full urinary control was achieved in only one.

Treatment

The vesical dysfunction is secondary to the neurological damage by the prolapsed disc, therefore the disc lesion must be dealt with before considering any operative intervention on the urinary tract. We suggest that three principles of management should be followed.

(1) Treat the disc prolapse, as this is the cause of bladder dysfunction.

(2) Treat urinary retention by catheterization to avoid permanent detrusor damage by overdistention.

(3) Prevent urinary tract infection by a high fluid intake and complete bladder emptying. In the early stages this is done by catheterization, later by regular voiding, and if there is a residual urine this can be eliminated by endoscopic surgery at the bladder neck or by division of the external sphincter to reduce the outflow resistance.

Disc lesions which produce vesical dysfunction are often multiple or of the massive central type. Most neurosurgeons and orthopaedic surgeons are agreed that disc protrusions severe enough to cause bladder dysfunction need surgery and that a cauda equina lesion is an absolute indication for urgent intervention. We must point out, however, that an acute disc lesion associated with minimal signs and urinary retention may resolve on conservative treatment alone (Case 2). It is important to note that if a painless retention is overlooked there is a high risk of permanent bladder damage.

The first type of vesical dysfunction which can occur is transient and follows operation on the prolapsed disc (Case 1). The urinary retention is usually painless but it is important to remember that if the distended bladder is not treated by catheterization there may be permanent detrusor damage by overstretching, resulting in a high residual urine with recurrent urinary infections and their sequelae and the rapid development of a hydronephrosis.¹⁵ Treatment of this postoperative variety is straightforward, usually by means of an indwelling Gibbon catheter (size 6F) for a few days. The catheter must be passed with the use of a urethral antiseptic, a closed drainage system being obligatory.

The second type of dysfunction is also transient and presents with retention which is usually of acute onset but often painless. Similar care is taken in the management of the catheter and drainage apparatus and a fluid intake of at least three litres daily is required to minimize the risk of ascending urinary infection and decubitus calculus formation. Prophylactic antibiotics are best avoided to prevent the emergence of resistant strains, but urinary acidification with hexamine mandelate (Mandelamine) or large doses of ascorbic acid may discourage infection. When an infecting organism is found, however, treatment with the appropriate antibiotic is indicated. The indwelling catheter must be changed weekly. Return of bladder function may be shown by the cystometrogram, and when bladder sensation has returned the catheter can be removed and the patient encouraged to void at regular intervals. A check must be made to ensure complete bladder emptying. It must be stressed that recovery may take several months.⁴

In spite of removal of the disc some patients may have permanent bladder damage, and this is more likely to develop among those in whom the urinary aspect of their condition has been overlooked. These patients present with recurrent urinary infections as a result of incomplete bladder emptying or may be found to have retention with overflow. Not only is bladder sensation absent but the detrusor is also weak (see Case 3). Removal of obstruction at the bladder neck or external sphincter level is necessary under these circumstances in order that the bladder outflow resistance is lowered enough to enable the bladder to empty completely. This can be done by endoscopic surgery and has been described elsewhere.¹⁶ Once complete bladder emptying is achieved urinary infection will spontaneously disappear in most cases.

The occult type has been well documented by Emmett and Love^{10, 11} and is illustrated by Case 5. Nearly all these patients are obese women whose disorders are frequently labelled "functional" or "urethral syndrome." Operative intervention to the urinary tract without dealing with the offending disc protrusion is useless. Generally recovery of normal micturition occurs within a few weeks after removal of the disc, though bladder recovery may be delayed in a few cases.⁴ If the bladder condition is of long standing and the detrusor is damaged endoscopic surgery to reduce outflow resistance may be needed as described above.

Discussion

Probably some of these cases in the past have been labelled in the early stages as urethral syndrome or recurrent pyelonephritis, and when incontinence or retention has supervened a functional cause has been blamed. Provided the symptoms of frequency and urgency and retention are associated with a sterile urine and a gynaecological cause and diabetic neuropathy are excluded, this should make one suspect the diagnosis and clearly indicate an investigation from the neurological point of view, including a cystometrogram. In view of the seriousness of condemning a young or middle-aged woman to use a permanent indwelling catheter it would seem justifiable to carry out a myelogram. Even if the results of this are doubtful it may well be advisable to consider an exploratory laminectomy or fenestration after due consultation with an experienced neurologist. The prognosis is good once the prolapsed disc is removed, even though there may be several months' delay in recovery of bladder function. Any residual urine can be eliminated by endoscopic surgery if the detrusor is weak, thus enabling the patient to void satisfactorily.

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