Understanding and management of low back pain

Introduction

There has been an epidemic of low back pain since World War II. Or, more accurately, an epidemic of low back disability (Waddell 1987). But back pain is not new. So what has changed about back pain? In this paper we will try to put this epidemic into historical perspective.

Pain and disability are not the same. They are obviously related but we must make a very clear conceptual distinction between them. We will look first at how back pain has been understood and treated through the ages. Then from a completely different point of view we will look at the history of low back disability. Finally we will see if changes in how back pain has been managed can help to explain the epidemic of low back disability.

Backache

There has always been back pain. The earliest surviving surgical text is the Edwin Smith papyrus from about 1,500 BC (Table 1, page 18). It is incomplete and ends enigmatically in the middle of a description of an acute back strain.

Examination. If thou examinest a man having a sprain of the vertebra of his spinal column, thou shouldst say to him: extend now your legs and contract them both. He contracts them both immediately because of the pain he causes in the vertebra of the spinal column in which he suffers.

Diagnosis. Thou shouldst say to him: one having a sprain in the vertebra of his spinal column an ailment I shall treat.

Treatment. Thou shouldst place him prostrate on his back...

At this tantalising point the unknown Egyptian scribe copying a much older text ceased his labours and subsequently died. Both he and the papyrus were buried in a tomb in the Upper Nile near Thebes where they lay for almost 3,500 years until the papyrus was found by grave robbers and sold to Edwin Smith in 1862 (Breasted 1930). The accuracy of the clinical descriptions in this text only adds to our frustration. We have no idea what they thought about backache or how they treated it. The ambiguity of the last sentence will be seen to be particularly frustrating when we look at the modern controversy about whether backache should be treated with rest or mobilisation.

Degenerative changes in the spine have been found in the earliest human remains. They occurred in Neandertal man (Stauss & Cave 1957) and even in dinosaurs (Blumberg & Solokoff 1961). The first studies of Egyptian mummies were thought to show ankylosing spondylitis and this caused much confusion before Bourke (1971) showed that these also were simple degenerative changes. This has been confirmed in remains from Nubia (Bourke 1967), early Alexandria (Prominska 1986) and Pueblo Indians (Stewart 1966). More recent spines from Medieval and Victorian England (Wells 1964) show the same. Such degenerative changes can be seen throughout human history. Indeed the spines in these studies are very similar to modern spines (Bourke 1971, McKern & Stewart 1957, Lawrence et al 1966). But the significance of these findings should not be over emphasised. Modern clinical studies have shown that there is very little relationship between degenerative changes and symptoms.

The symptom of pain in the back is the common link between the simple backache which most people have at some time in their life, a number of serious spinal diseases and low back disability. Deformities and fractures are well documented from the time of Hippocrates (Adams 1849). Pain in the back was discussed in the context of such diseases but there is little doubt that some was simple backache. It was recognised but received little medical attention. The real question is when simple backache became what we now regard as a medical problem.

Western medicine can be traced to the Corpus Hippocraticus (circa 400 BC), the collected writings of the Greek library at Cos and Cnidus. It was then dominated by the writings of Galen of Pergamon (circa 150 AD) and his disciples for 1200 years. In these writings back pain can be found as a symptom of many illnesses but also as one of the "fleeting" pains that affected joints and muscles. Treatment was purely symptomatic. Spas, soothing local applications and counter irritants were used. When the Graeco-Roman Empire fell, exiled Christians under Nestorius took medical learning to Persia from where it was reintroduced to Europe after the Dark Ages.

Islamic laws forbad dissection and frowned on surgery which limited the Arabic contribution to the preservation of the ancient writings. Little new was added to the knowledge of back pain.

Medical thought almost ceased during the dark ages as patient care moved into the hands of the church. Only degenerate forms of the ancient writings were saved. But back pain persisted in folk medicine. The Welsh name "shot of the elf" and the Germanic "witch's shot" reflect the belief that pain was due to external influences (Keele 1957). In North East Scotland the mother or child of a breech birth were believed to have special power in their feet to treat lumbago (Black 1883). In Derbyshire the legs of people with sciatica were smoked in a fire of ferns (Cockayne 1864). More conservatively, the people of Exmoor used simple incantations (Black 1883).

Modern medicine is based on the disease model of illness which began with the spread of scientific thought after the Renaissance. The teaching of Galen had been based on the humoral concept of disease which saw illness as symptom complexes: treatment was empirical. Paracelsus (1493-1541) rebelled against blind adherence to the ancient writings and began clinical freedom by treating each patient on the basis of his own clinical observation and diagnosis. It still took several centuries to break free from the concepts of Galen. The reintroduction of anatomy (Vesalius 1543), the discovery of the circulation (Harvey 1628) and descriptions of pathological anatomy (Morgagni 1761) laid the scientific foundations for modern medicine. Sydenham (1624–1689) distinguished illness from underlying disease and established our present concept of individual diseases with characteristic symptoms and signs (Sydenham 1734). Low back pain or lumbago was classified with the diseases called rheumatism. The term rheumatism came from the Greek rheuma, a watery discharge or evil humour which flowed from the brain to cause pain in the joints or other parts of the body. Modern usage of the term started with Baillou (1642). But the term included what we now recognise as many different pathologies ranging from acute rheumatic fever to arthrosis. The only common feature was pain in joints or muscles. Rheumatism was thought to be caused by exposure to cold and damp (Heberden 1816, Cullen 1797) and trauma was specifically excluded (Fowler 1795). A number of individual pathologies were then identified within this group. Sydenham, who himself suffered from gout, distinguished gout from acute rheumatism and described lumbago as a third form of rheumatism (Sydenham 1734). Cullen (1797) differentiated acute and chronic rheumatism and described venereal and scorbutic pains.

By 1800 physicians began to look for a cause for back pain itself. It was generally believed to be a build-up of rheumatic phlegm in the muscles and both local and systemic treatments were used to remove the phlegm. Scudamore (1816) published the first systematic treatise on chronic rheumatism and blamed inflammation of the white fibrous tissue of the body "unaccompanied by fever but aggravated by motion". The inflammation was still thought to be due to cold and damp. Throughout the 19th century treatment of back pain consisted of general measures against rheumatism such as relief of constipation, counter irritants, blistering and cupping. The theory was now to remove the rheumatic exudi from the affected area. With improved knowledge of pathology distant causes of back pain were recognised such as aortic aneurysm, gastric cancer, gynaecologic disorders and tuberculosis (Johnson 1881). By analogy, septic foci such as teeth and toenails were also removed as they were believed to cause arthritis.

Two key ideas in the nineteenth century laid the foundations for our modern approach to back pain. These ideas were that back pain came from the spine and that it was due to trauma. In 1828 Brown, a physician in Glasgow Royal Infirmary, wrote a paper on spinal irritation. Brown suggested for the first time that the vertebral column and the nervous system could be the source of back pain. He emphasised local spinal tenderness. Brown's concept of spinal irritation swept Europe and had a profound effect on medical thinking for nearly thirty years (Walser 1969). Papers followed in the USA (Parrish 1832), France (Ollivier 1837) and Germany (Stilling 1840). The exact pathology of spinal irritation was never shown and the diagnosis gradually disappeared. But the idea that the spine could be a source of pain was firmly established and the idea that a painful spine must somehow be irritable remains to this day.

It is not easy for us to realise that all through history chronic back pain was not thought to be due to injury. This idea did not come till the latter half of the 19th century. The industrial revolution and particularly the building of the railways led to a spate of serious injuries and only then did other cases of back pain begin to be blamed on trauma. It was argued that simple backache might be due to more minor injuries to the spine or to cumulative trauma. It was also thought that the speed and nature of early railway travel could by itself be harmful to health (Lancet Commission 1862). The condition became known as Railway Spine (Erichsen 1866). Railway spine, like spinal irritation, was a key event in this story and will reappear again. Suffice it to say at this point that for the first time back pain was firmly linked to trauma.

Sciatica

The word sciatica has been used since Greek times, for ischias or pain arising from or around the hip and thigh. Before modern ideas of pathology the term did not mean pain in the distribution of the sciatic nerve.

Hippocrates (460-370 BC) noted that "ischiatic" pain mainly affected men aged 40-60 years and that in younger men it usually lasted 40 days. Radiation of pain to the foot was regarded as a good prognostic sign but if it stayed in the hip it was dreaded. Aretaeus (150 AD) first separated nervous and arthritic "sciatica". He blamed nervous sciatica on an excess of cold and suggested that the remedy was local heat. Spas, soothing ointments and counter-irritants were used. This theory culminated in the use of cauterisation which was first mentioned by Hippocrates and is found throughout the ancient writings. Dioscorides (100 AD) described Dung cautery which probably came from Arabic cauterization with goat's dung. Albucasis (1100 AD) described local and wrist cauterization for sciatica and illustrated a number of the instruments used. Other great Graeco-Roman figures such as Galen (120-199 AD) added little to the understanding of sciatica although Paul of Aegina (652–690 AD) did describe laminectomy for spinal injury. The need for differential diagnosis of pain around the hip, the effect of cold and damp on symptoms and treatment by local heat can still be seen in clinical practice today.

The first book on sciatica was written in 1764 by Contunnius Domenicus (or Domenico Cotugno) (1736–1822). He integrated the new concepts of anatomy and pathology with clinical observation. He differentiated nervous and arthritic sciatica and subdivided nervous sciatica into anterior and posterior. He knew that the condition could be continuous or intermittent and stated that sometimes the continuous became intermittent but never vice versa. This, apart from Hippocrates' original observation that most attacks recovered in 40 days, is one of the first observations on the natural history of recovery. Contunnius thought that sciatica was due to an excess of fluid surrounding the nerve—perhaps not surprising as he had been the first to describe the dural sac and cerebrospinal fluid. Treatment tried to remove the excess fluid by cupping, blistering and in particular by aquapuncture where needles were put into the nerve itself to draw off the excess fluid. After Contunnius sciatica was recognised as a clinical entity although its cause remained obscure. For many years sciatica was referred to as Cotugno's Disease. Sciatica was still classified as a rheumatic condition.

Throughout the 19th century sciatica was regarded as an inflammation of the sciatic nerve due to some kind of rheumatic condition. The inflammation was believed to be either primary or secondary. Primary causes included gout, rheumatism, syphilis, neuromata, poisons, trauma or cold. Secondary causes included pelvic tumours, a distended rectum and bone disease, especially hip joint disease. This shows the new emphasis on identifiable pathology. But Fuller (1852) in a book on Rheumatism, Rheumatic Gout and Sciatica stated that "the history of sciatica is, it must be confessed, the record of pathological ignorance and therapeutic failure". The nonfatal nature of the condition meant that there was little chance for pathological study. Hunt in 1905 could only find 11 published cases of postmortem investigation of sciatica between 1764 and 1878. In only three cases had there been histology and all had been completely normal. Hunt himself reported the post mortem and histological examination of the sciatic nerve in a labourer with sciatica who had died of pneumonia. He found a gelatinous deposit in the nerve but no gross or microscopic inflammation. Unfortunately he did not open the spinal canal. Dezerine (1914) and Sicard (1918) tried to localise the inflammation. They introduced terms such as radiculitis, funiculitis, neuritis, plexitis and ganglionitis to describe the part of the nerve affected: "neurodocitis" was the term for irritation within the nerve root canal (Putti 1927).

Vesalius illustrated the anatomy of the intervertebral disc in De Corpora Humani Fabrica in 1543. Bell (1824), Kocher (1896), Virchow (1857) and Luschka (1858) all reported single cases of major trauma with disc damage causing paraplegia. But these were isolated autopsy findings which were not related to the clinical symptom of sciatica. Luschka (1858) first adequately described and illustrated two cases of prolapsed intervertebral disc. He actually demonstrated a connection from the nucleus pulposus through the posterior longitudinal ligament to the protrusion. But again he did not relate this to the clinical symptom of sciatica. Later Schmorl (1929) and Andrae (1929) published detailed post mortem studies of large series of spines. They described both posterior disc protrusions and protrusions into the vertebral bodies (Schmorl's nodes) but thought that most were asymptomatic in life (!). But although pathologists identified such disc lesions they consistently failed to relate them to sciatica.

By the earlier part of the twentieth century the more severe cases of sciatica with neurological involvement were treated by neurologists. These patients presented with signs similar to cauda equina tumours and some were sent to the newly emergent

neurosurgeons. Early reports of negative exploratory laminectomy with subsequent improvement (Horsely 1909, Bailey & Elsberg 1912) probably included some cases of disc prolapse. Soon surgeons began to report benign cartilaginous tumours or enchondromas in the spinal canal (Oppenheim & Krause 1909, Elsberg 1928, Bucy 1930). These always arose in the region of the intervertebral disc and could be found throughout the spine (Stookey 1928). Elsberg (1931) raised the possibility that they were posterior protrusions of the disc as described by the pathologists but he thought that there were histological differences and rejected the idea.

Orthopedic principles and rest

Modern treatment for low back disorders is closely linked to the evolution of orthopedics and the key orthopedic principle of rest.

From Nicholas Andry in the early 18th century the early proponents of orthopedics were mainly concerned with childhood deformities. From the start there was disagreement about the relative merits of rest and mobilisation. At first the French School including Andry advocated mobilisation. As early as 1825 Delpeche had established the first Back School in Montpellier—for deformity, not back pain (Delpeche 1828). Rest as a treatment had been proposed by John Hunter (1794) and was amplified by Hilton in his 1862 series of lectures on "Rest and Pain" (Hilton 1920). But throughout the 19th century the orthopedic principle of rest became dominant, especially through the work of Hugh Owen Thomas (Thomas 1875, Keith 1910). Ancient texts on spinal fractures all assumed that these patients went to the "sick bed". But it should be emphasised that this was an effect of the injury rather than a treatment. Orthopedics for the first time saw rest as a treatment.

From these roots orthopedics extended its interest in the latter half of the 19th century to include a wider range of musculoskeletal problems, particularly tuberculosis and arthritis. This was a time of increasing medical interest in physical therapies such as physiotherapy, manipulation, electrical therapy and hydrotherapy. Early orthopedics also took much from bone setters and sprain-rubbers, especially for trauma (Cooter 1987a). In Britain the pioneer of modern orthopedics was Hugh Owen Thomas (1843-1891), a qualified medical practitioner from Liverpool who came from a long line of Welsh bone setters. Thomas worked with his father as a bone setter for less than a year before separating from him. There was an inevitable conflict of interest between the new orthopedic doctors and lay bone setters. Thomas incorporated many of the bone setter's manipulative skills into modern orthopedics. But he rejected many of the bone setters' principles, especially that of mobilisation. In complete contrast, he advocated rest—"enforced, uninterrupted and prolonged". This could be achieved by bracing, by bedrest or later by surgical fusion. This theme was continued by his pupil and nephew Sir Robert Jones (1857–1933) who was the ambassador of modern orthopedics as a specialty and spread Thomas' teaching throughout the English speaking world (Osmond-Clarke 1950).

From their interest in spinal deformities orthopedic doctors first became interested in sciatica because it was associated with sciatic scoliosis. This had been described by Gussenbauer in 1878 and named by Brissaud in 1890 (Bick 1948). It was a natural step for orthopedics to apply, and the modern treatment of sciatica began.

Orthopedic interest in spinal deformities, arthritis and sciatica inevitably expanded to include back pain. The search for a structural cause for sciatica and for back pain both focused on the spine. Backache and sciatica had previously been regarded as separate entities. From now on they became inextricably linked in the spine. Since that time much confusion has arisen because of failure to distinguish our theory and treatment of backache and of sciatica.

The discovery of x-rays began a whole new perspective on spinal disorders (Roentgen 1895). For the first time it was possible to visualise the spine during life and every incidental x-ray finding proved an irresistible temptation to explain both back pain and sciatica. Lumbosacral anomalies (Adams 1910, Danforth & Wilson 1925), facet joint degeneration (Goldthwaite 1911, Putti 1927) and sacroiliac disease (Goldthwaite and Osgood 1905) were all blamed. Operations to "correct" them included sacroiliac fusion (Smith-Petersen 1921, Campbell 1927, Gaenslen 1927), lumbosacral fusion (Hibbs 1929), transversectomy (Adams 1910) and facetectomy (Ghormley 1931, Williams and Yglesias 1933). The problem of back pain remained intractable.

The scale of the casualties in World War I was unprecedented. For the first time medical concern with trauma matched previous concentration on disease. It also brought the treatment of fractures within the scope of orthopedics. Between the two World Wars orthopedic specialists fought to gain control of fractures and so enlarge their professional interest, particularly as deformities and tuberculosis were becoming less common (Jones 1920, Cooter 1987b).

This was only part of a wider shift of medicine to focus more attention on accidents and trauma. But one effect was to place greater emphasis on back pain as an injury and hence within the growing province of orthopedics.

Orthopedic principles of treatment were increasingly applied to both back pain and sciatica. By 1900 a standard orthopedic text could recommend two to six weeks strict bedrest for acute lumbosacral pain (Bradford & Lovett 1900). This was completely contrary to earlier management. Sydenham (1743) had insisted that arthritic patients should be kept mobile "for keeping bed constantly promotes and augments the disease". One of the earliest orthopedic texts on back pain itself was a lecture by Johnstone (1884) in which he advised against bedrest. Indeed he thought that bedrest was a cause of back pain. General orthopedic acceptance of rest in general and bedrest in particular was based on the new idea that low back pain and sciatica were due to traumatic inflammation which must be allowed to heal. It was believed that chronic back pain would develop if the primary injury was not treated properly by rest (Painter 1926). Chronic back pain might also develop if repeated injuries or cumulative minor injuries were not prevented (Love 1938). This whole approach gained a firm theoretical basis and great impetus in practice with the discovery of the ruptured disc.

Bone setters had treated back pain by manipulation and mobilisation. They did this in the context of everyday life and their clients continued everyday activities. Orthopedic practitioners moved back pain into a medical context. Back pain was now a disease and the sufferer was a patient. Orthopedic treatment by rest, particularly by bedrest, removed the patient from everyday life and in itself involved disability. Rest was firmly established in orthopedic circles during the latter part of last century but the spread of the message was slow. As early as 1904 Gowers tried to advise the rest of the medical profession to use the orthopedic treatment of bedrest for lumbago but this fell on deaf ears. Between the two World Wars the American Academy of Orthopedic Surgery Commission on Back Pain was able to report in a survey of all its members that "the general trend seems to be for longer and more complete rest" (Bellingham et al 1928). Yet as late as 1966 some family doctors could write "little discussion of low back pain and its treatment ... is given in the standard textbooks of orthopedics"—or at least those read by family doctors (Dillane et al 1966). It was also recognised at an early stage that bedrest created problems. By 1923 Jones & Lovett felt that they had to qualify their prescription of bedrest with the advice that "as soon as possible, movement must be encouraged and bed forbidden". Nor has this orthodox orthopedic approach to back pain and sciatica gained universal acceptance. Even today only some 50% of people with backache seek any medical help (Nuprin 1985, Consumers' Association 1986). Bone setters, like their descendents osteopaths and chiropractors today, continued to treat the common everyday aches and strains for which orthodox medicine had no good answer and only equivocal interest.

The sacro-iliac joint as an example of medical thought

The effect of medical theories and fashions on the treatment of low back pain can be seen most clearly in the story of the sacroiliac joint. The sacroiliac joint can be seen as one of the first attempts to explain and treat backache in orthopedic terms.

Before 1900 the sacroiliac joint was considered a rare site of orthopedic disease. Only acute and chronic forms of sacroiliac infection were known (Bradford & Lovett 1900). In such cases the main symptom was low back pain but direct irritation of the lumbosacral plexus was also known to cause sciatica. Treatment consisted of surgical drainage (Van Hook 1888) or excision of the joint in severe cases (Buchanan 1898) but both pyogenic and tuberculous infections were usually fatal. Obstetricians however saw the sacroiliac joint differently. From the time of Hippocrates they recognised that relaxation of the sacroiliac joints occurred in pregnancy. In 1870 Snelling noted that sciatic pain could also be present. These obstetric observations were brought to the attention of the orthopedic world by two men whose writings had a powerful influence on orthopedic practice (Goldthwaite & Osgood 1905). They argued that relaxation or increased mobility of the sacroiliac joints could also occur with menstruation, trauma, general weakness or other ill defined conditions. They suggested that in trauma or general weakness there was a higher incidence of pain radiating to the hip or leg. By emphasising mobility they extended the concept to an acute or chronic slip or subluxation of the joint. These ideas greatly widened the diagnosis of sacroiliac pain. The variability of symptoms was attributed to varying degrees of mobility. Even the inability to detect mobility clinically did not exclude joint disease. Treatment in most cases was immobilisation by strapping or plaster cast and the degree and duration of immobilisation was related to the severity of symptoms. But the treatment of dis-

placement could also include manipulation, a technique borrowed from the bone-setters (Keith 1919).

The next decade saw increasing orthopedic interest in the sacroiliac joint as a source of back pain and sciatica. In 1911 Goldthwaite published a case report of sacroiliac manipulation which later became one of the landmarks in the story of the intervertebral disc. Sacroiliac theories abounded. Irritation of the joint was thought to cause sciatica either by direct irritation of the sciatic nerve or by causing muscle spasm in the pyriformis or the hip flexors (Yeoman 1928). These theories led to operations to fuse the sacroiliac joint (Smith-Peterson 1921, Gaenslen 1927, Campbell 1927). Alternative soft tissue procedures included division of the pyriformis (Frieberg & Vinke 1933) or the gluteal muscles (Heyman 1934). A great debate developed between the supporters of the sacroiliac or the lumbosacral origin of low back pain and sciatica (Williams 1932, Frieberg & Vinke 1934). One benefit was a greater emphasis on differential diagnosis (Smith Petersen 1915, Wentworth 1916, Miltner & Lowendorf 1931). The controversy led the Clinical Orthopedic Society to commission the first though not the last report on back pain (Billington et al 1928). This simply confirmed the confusion over the causes of low back pain and showed the strong feelings held by each group. As an example of this confusion an operation for combined sacroiliac and lumbosacral fusion or trisacral fusion was devised and reported to be successful in five cases (Chandler 1929). A complete study of the diagnosis, operative procedure and operative results of sacroiliac fusion was published by Smith Petersen & Rogers (1926). By this stage they dealt mainly with what they considered to be "traumatic arthritis" of the sacroiliac joint. They claimed relief of pain in almost 90% of patients although they noted that patients with severe radiating pain took up to six months to recover from the operation. Smith Petersen performed this procedure on his own wife after she had suffered years of invalidity and apparently achieved great success. Osgood (1919) later admitted some misgivings. "Although I admit without regret that I was a partner in what I believe was a sort of re-discovery of displacements and relaxations of the sacroiliac joint as a common cause of back sprain, no one regrets more than Colonel Goldthwaite and I the carelessness with which the diagnosis of sacroiliac disease is made today".

After the publication of Mixter & Barr's paper in 1934 the whole emphasis of sciatica shifted to the intervertebral disc. Orthopedic surgeons gradually lost interest in the sacroiliac joint and sacroiliac surgery is now rarely performed for low back pain. The sacroiliac joint reverted to the modern descendants of the bone-setters who continue to give relief to large numbers of sufferers.

The dynasty of the disc

The modern concept of disc prolapse is based on four papers by Goldthwaite (1911), Middleton & Teacher (1911), Dandy (1929) and Mixter & Barr (1934). Although pathologists had described prolapsed intervertebral discs at post mortem there was no clinical awareness of the condition. In 1911 two papers independently described cases of massive disc prolapse and pointed out the possible clinical significance. Middleton & Teacher (1911) reported a case of fatal paraplegia following a central disc prolapse and related it to the "sprains and racks of the back". They also reported a crude laboratory experiment in which they simulated the injury to produce a disc prolapse. Goldthwaite (1911) first raised the possibility of compression of the nerve at the lumbosacral joint and this was supported by others (Rogers 1917, Danforth & Wilson 1925, Putti 1927). Goldthwaite gave a detailed clinical description of a case of paresis which occurred after manipulation of the back for a "displaced sacroiliac joint". Harvey Cushing performed a laminectomy which was regarded as negative apart from "narrowing of the canal" at the lumbosacral junction. In an anguished search for the cause of this iatrogenic disaster the disc was postulated as the cause of "many cases of lumbago, sciatica and paraplegia". The first complete clinical account of a sequestrated disc causing paraplegia came from Dandy (1929). This beautifully illustrated article described two cases with myelographic evidence of complete block, significant neurology, a presumptive diagnosis of spinal cord tumour and histological proof of a sequestrated disc. There was clinical recovery in both cases. His only mistake was the assumption that the condition resembled osteochondritis of the knee. Mixter & Barr's classic paper of 1934 drew attention to these earlier works and also that of Bucy (1930), Petit-Dutailles & Alajouanie (1928) and Mauric (1933). Neurological understanding of sciatica prior to Mixter & Barr is well summarised by Leszynsky (1921) and the associated orthopedic concepts by Craig & Ghormley (1933).

On 30 July 1932 in a corridor of the old Bullfinch Building of the Massachusetts General Hospital a neurosurgeon and an orthopedic surgeon met and discussed a surgical case from the previous day. This inter-disciplinary meeting started the work which

identified the prolapsed intervertebral disc as a cause of sciatica (Mixter 1949, Barr 1977). Since then our entire pathological understanding of sciatica has been dominated by the intervertebral disc and this whole era has been well called the "Dynasty of the Disc".

The neurosurgeon was William Jason Mixter, a prominent Boston man with a special interest in spinal tumours. The orthopedist was Joseph S Barr who was struggling to make a name for himself in private practice. The patient was a man who had a skiing accident in 1930. This had caused left sided sciatica which recovered with bedrest under the care of Dr Robert Maynard of Burlington, Vermont. The symptoms recurred in 1932 and the patient attended Dr Frank Ober, one of Barr's associates. They did not think that he should be treated by manipulation and instead sent him to Dr Mixter because they thought he might have a spinal tumour. The neurologist Dr Victs carried out a lipiodol myelogram which did not show any block in the spinal canal and was reported to be negative. Despite this Dr Victs and Dr Mixter remained anxious about the possibility of tumour and an exploratory laminectomy was carried out. The operative diagnosis and initial pathology report was of an enchondroma.

At the time Barr was laboriously reviewing Schmorl's book and he wondered if this patient's lesion might be similar to the posterior disc protrusion described by Schmorl. During the corridor discussion Barr questioned the diagnosis of tumour because of the history of trauma. Mixter recalled that the pathologist Dr C. Kublik had expressed reservations about the diagnosis of tumour in a similar case in 1930 as "the removed material looked like normal cartilage". Mixter and Barr decided to review the histology of all previously excised chondromas of the spine and compare them with normal intervertebral discs. Special sections had to be made as no normal disc sections were available at Harvard Medical School: no one had ever been interested in the disc before. There were sixteen specimens labelled enchondromas in the pathology laboratory. Ten proved to be normal disc cartilage. Mixter and Barr then began to look for patients with cauda equina lesions which might be caused by such a lesion. On 19 December 1932, six months after the initial discussion, the first patient entered the operating room of the Massachusetts General Hospital with a pre operative diagnosis of "ruptured intervertebral disc".

The idea was slow to be accepted. Barr's first presentation to the Peter Bent Brigham Alumini Reunion in 1933 met an indifferent response. It was not until the paper was read to the New England Surgical Society and then published in the New England Journal of Medicine (Mixter & Barr 1934) that the medical profession began to take note of their findings. The original 1934 paper gets deserved credit for showing that what had previously been thought to be an enchrondoma was in fact the intervertebral disc. It also emphasised that disc rupture could present with neurological loss and could be treated surgically.

A much more radical paper came the next year from Mixter & Ayer (1935). This important though rarely quoted paper added a number of key ideas to the original concept of disc prolapse. It widened the idea of disc rupture to the differential diagnosis of low back pain even when there was little or no neurological abnormality. It started modern myelography by describing Dr Hampton's modification of the lipiodol myelogram. He used large (5mL rather than 1mL) quantities of dye and made the diagnosis on indentation of the dye column rather than a complete block. This was quite different from previous practice in spinal tumours. Even at this early stage the paper acknowledged that the results of disc surgery were less than ideal. It recognised that leg pain was cured in all but one case but "some patients complain subsequently of lame back". It had the first death attributable to disc surgery when fecal soiling led to postoperative meningitis. Most important however was the paper's emphasis that the lesion was traumatic in origin. This emphasis was given even though any history of even minor trauma could only be obtained in 14 out of 23 cases. This led to the diagnosis of disc lesions as "injuries to the spine". The authors admitted that this concept "opens up an interesting problem in industrial medicine". It opened the way to industrial accident compensation. They also favoured the emotive term "Herniation or Rupture" rather than the "prolapse of the nucleus pulposus" suggested by Schmorl. It is this 1935 paper which should really be regarded as the start of the dynasty of the disc.

It was at first difficult to convince neurosurgeons and orthopedic surgeons that the small piece of disc tissue removed at surgery was the cause of sciatica. Surgeons such as Love of the Mayo Clinic scrubbed with Mixter to see the lesion and became advocates of disc surgery. In 1938 Love reported his first one hundred cases (Love & Walsh 1938) including the first reported recurrence of a disc prolapse. Within two years he published a series of three hundred cases (Love & Walsh 1940). Love and enthusiasts like him popularised the operation and gave detailed accounts of the surgical procedure but no results admitting freely that it would be difficult to assess the results of disc surgery as "the question of liability, compensation and insurance loom large on the horizon and add

complications compounded to an already knotty problem". Love and other surgeons at this time also emphasised the role of single or repeated episodes of trauma. Trauma had begun to be accepted as a cause of some backache before the end of last century, but it was only with the increasing diagnosis of disc injury that trauma became generally accepted as the cause of most backache. In their History of the Second World War (Buckley & Copeman 1952) noted that "exposure was less often attributed as a cause of fibrositis and other rheumatic conditions than in 1914–18 war and strain was more frequently deemed responsible".

The diagnosis and surgery of disc lesions gradually became accepted. Diagnosis was originally based on neurological signs and a complete block on the myelogram (Mixter 1937, Camp 1939). It was soon made on symptoms alone. There was concern about the persistence of the dye and the cost and discomfort of lipiodol myelography. Dandy thought that myelography should be avoided as it was unnecessary, had potential complications and could miss "concealed discs" (Dandy 1941). Clinical criteria for disc surgery were suggested (Spurling & Bradford 1939, Spurling & Grantham 1940) and Semmes (1939) published 16 cases diagnosed solely by clinical history and neurological examination. These moves away from the early strict criteria unleashed on the unsuspecting public a wave of surgical enthusiasm hindered only by World War II. It was only later that surgical disasters reminded surgeons of the careful criteria used in the original papers and led to questions about the merits of the uncontrolled wave of disc surgery. This was exemplified by a paper by Key (1945) which caused a furore at a meeting of the Southern Surgical Association. He claimed that "Intervertebral disc lesions are the most common cause of low back pain with or without sciatica". Even the published discussion was heated and included a comment by Magnuson that this was no more logical than saying that "all kittens born in an oven are biscuits". Unfortunately Key was only voicing how many surgeons thought about back pain. Critical review of disc surgery today suggests that this controversy is still not fully resolved.

Between the 1930s and 1950s modern surgery and anesthetics became routine. There was a great interchange of ideas during World War II and gradual world wide acceptance of the diagnosis of disc lesions. O'Connel performed one of the first disc operations in Britain in 1937 and published a personal series of 75 cases by 1943. This matches Pennybacker's comment in 1964 that "it was nearly ten years after Mixter & Barr's paper before the lesion received general acceptance in this country". By the 1950s there was an explosion of disc surgery which was closely linked to the growth of neurosurgery as a specialty. Indeed at one time it was claimed that the average American neurosurgeon made half his income from disc surgery. But the rapid and enthusiastic expansion of disc surgery soon exposed its limitations and failures. It was accused of leaving more tragic human wreckage in its wake than any other operation in history (DePalma & Rothman 1970). Pain clinics, which are full of patients with failed low back surgery, continue this accusation. By the 1950s it began to be conceded that the diagnosis and surgery of disc prolapse should be directed to sciatica rather than back pain. Not to be daunted the concept of "disc lesions" was soon extended, particularly by orthopedic surgeons who were keen to re-establish their role in low back disorders. If disc prolapse was the cause of sciatica then disc degeneration might be the cause of low back pain. The normal age-related nature of these degenerative changes was ignored, as was their limited relationship to symptoms. Biomechanical studies were used to justify the hypothesis, again despite their lack of clinical correlation. Disc lesions could once again be blamed for most backache. The tragic implication was that the condition was by its very nature irreversible and progressive. Once again, quite illogically and unjustifiably, the diagnosis was used to extend the treatment for disc prolapse to all backache. Disc surgery was extended to spinal fusion for theoretical instability, though neither the instability nor the symptomatic results of fusion have ever been proven. Much more fundamental and far-reaching in its consequences was the more widespread use of rest for simple backache.

The history of low back disability

Disability is diminished capacity for everyday activities and gainful employment.

Let us look first at the historical incidence of low back disability. Then we will look at some of the psychological and social ideas which have influenced it.

Disability

There is little mention of low back disability in ancient times though we must realise that not much medical attention was given to any form of disability. Seriously ill people who took to the sick bed usually did not survive long. Continued disability depends on some form of social support. The early codes of compensation dealt only with serious bodily mutilation and do not mention compensation for anything so minor as backache. There was little scope for low back disability which was probably absorbed into the community. It was ignored by medical writers, and probably by the general population, in the face of severe disease. Some cripples became beggars. But it seems unlikely that simple backache was easily accepted as a reason for chronic disability in ages dominated by epidemic infections, limited food supply and a life expectancy of less than 40 years. Where is the low back disability in the third world today? Chronic low back disability, apart from rare exceptions, was probably simply not possible before the complex changes in society after the industrial revolution.

Our modern concept of disability is closely related to our present pattern of work as gainful employment. After the industrial revolution there were radical changes in the whole social structure including working patterns, the financial organisation of society and the need to provide financial support for those who were unable to work. Our present view of low back disability only dates from that time.

The relationship between work and low back pain was recognised from the very beginnings of occupational medicine. In his "Treatise on the Diseases of Tradesmen" published in 1705 Ramazzini stated that servants at court who stood for long periods and weavers by the violent action of their looms were susceptible to "pains in the loyns". Fowler (1795) noted that "the lumbago is a very common disease among labouring farmers from their frequent exposure to cold and hardships". These are however isolated references and no mention is made of any associated disability.

The first direct evidence of low back disability came after the introduction of the railways. In a report "On the Influence of Railway Travel on the Public Health" the Lancet Commission (1862) gave figures showing that the amount of sickness in railway workers was greater than in mariners, miners and labourers. Lumbago was one of the main causes. Railway spine became an increasing problem between 1860 and 1880. But there does not appear to have been any prolonged low back disability till the 1880s and 1890s when it was first reported in the context of compensation.

Industrial back pain and low back disability became a more widespread problem during the first two decades of the 20th century. King published one of the first papers specifically about industrial back pain in 1915 by which time the problem was clearly increasing. By the early 1920s there was a spate of such articles. The medical answer to the problem was thought to lie in better diagnosis, better treatment and the detection of malingering (Gullan 1912, King 1915, Sever 1919). The industrial answer was thought to lie in better selection of employees coupled with better working practices. These ideas were supported by the findings of the US Draft Board in the First World War. Conscripts were examined and many were rejected because of "static problems" which it was thought might predispose to backache. Despite this selection many recruits broke down with backache during intensive training and the alarmed authorities had to arrange special training battalions for these men. The results are worthy of note. By patient training 80% of these "derelicts" could quite quickly be made fit for service (Osgood & Morrison 1924). It was suggested that back pain might be "a fitness problem" rather than a medical problem.

There are no general population statistics on low back disability before 1930. Epidemiologists were still concerned with mortality, infection diseases and child health. Nevertheless by 1921 the increasing

problem prompted the UK Ministry of Health to commission a report on the incidence of rheumatic diseases. This found that 16% of all disability was due to rheumatism. 55% of that was due to lumbago, muscular pain and undefined rheumatism. Lumbago itself caused 33% of the episodes of male incapacity although this only accounted for 11% of the days lost (Ministry of Health 1924).

Some of the first population morbidity statistics in the world came from the Department of Health for Scotland in the 1930s (McKinlay et al 1937, Department of Health for Scotland 1937). This national survey of chronic morbidity included all those who had been sick listed continuously for twelve months (1935-36). Rheumatism caused 13% of all chronic disability, and 75% of this was lumbago, muscular and undefined rheumatism. Rheumatism was now a commoner cause of long term disability than tuberculosis (11%) despite the fact that tuberculosis was still rife and uncontrolled. Only "insanity" was commoner (21%) and this included all mental diseases. The important point was made that this rheumatic disability mainly affected young people. It was also emphasised that chronic disability due to rheumatism was increasing more rapidly than that due to any other cause.

Further evidence of increasing low back disability during this period comes from the official histories of the British Forces in the First and Second World Wars (Macpherson 1921, Buckley & Copeman 1952). Lumbago was the cause of 0.23% of medical admissions in 1914–18 and 1.1% in 1939–44. The military term "Medical Admission" means withdrawal from army duties and is closer to sick certification than to modern civilian hospital admission. This five-fold increase in low back pain contrasts with an unchanged admission rate for sciatica, 0.2% in both wars. The outcome of low back pain also changed. In World War I 50% were back to duties within two weeks. By World War II the average period off duties was stated by one observer to be two months (Buckley & Copeman 1952). He also noted that "the men are often reconciled to being a chronic case". By World War II "fibrositis and mild referred sciatica pain has ousted dyspepsia, diarrhoea and headache as the chief cause of frequent and prolonged hospitalisation" i.e. withdrawal from army duties.

There is one fascinating footnote. That is almost exclusively the story of low back disability in men. Female low back disability lagged behind male disability and only in the last few years has it caught up. This may reflect the different social roles of men and women, particularly regarding work, and the recent growth in sexual equality.

The increase in low back disability since World War II is accurately documented and well known (Waddell 1987). This review suggests that low back disability as we know it today has developed over the past century. Disability however is only partly explained by physical disease. To understand this epidemic of low back disability we must also look at the social and psychological changes which have influenced it.

Compensation

The history of low back disability is closely linked to compensation legislation and most modern definitions of disability imply an element of compensation. It is wrong to infer that disability is caused by compensation. Indeed the converse is true: legislation for compensation was only passed after a need was recognised. But compensation does provide the social support which makes chronic disability possible. And it is naive to deny that the prospect of compensation does attract claims, not all of which will be equally merited. "The compensation dole has made a lazy hibernation possible" (Osgood & Morrison 1924). The compensation system certainly gave us the earliest and most accurate statistics on low back disability but again we must remember that there may also have been non-compensation disability which was simply not recorded.

It is often thought that compensation for accidental or negligent injury dates from the social, industrial and medical revolutions of the nineteenth century. Our present form of social insurance for sickness and injury did originate at that time. But this under-estimates the importance which early man placed on himself and his labour. Compensation seems to be one of the earliest social and legal characteristics of civilisation. Mutual help may even be one of the reasons for the success of human society.

One of the earliest examples of compensation, perhaps surprisingly, was for medical negligence. This predates written history. The Code of Hammurabi (circa 1752? BC) specifically made the surgeon responsible for his action. The Code stated that if a slave died as a result of treatment then the surgeon had to replace him. If a freeman died then the surgeon's right hand was cut off. In the Edwin Smith papyrus (circa 1500 BC) each patient is dealt with in a strict and stylised order. First the doctor examined the patient. Then he made a diagnosis. Then he stated whether he would treat the patient or not. If the outcome was likely to be fatal no treatment was offered:

"this is a case I will not treat". It was well recognised that to kill or even fail to cure a patient might result in the punishment of the doctor. These drastic measures were in keeping with the harsh morality of the times and the need to deal with many fraudulent medical men. These ideas spread to Persia where the granting of licences to doctors first began. In order to practise on the faithful worshippers of Mazda a surgeon first had to operate on three infidels. Only if they survived was a license granted. But if one of these patients died and the unlicensed surgeon then operated on one of the faithful with a fatal result he was tried for murder. From these early beginnings developed the complex ethics and regulations which govern the practice of medicine today.

Ancient compensation codes still survive. The most primitive reparation was that of "ius Taliones". The best known example is the Hebrew Law of Moses (circa 800 BC) "an eye for an eye; tooth for tooth; hand for hand; foot for foot." This would at first appear to be simply a form of retaliation but that is an oversimplification. In the Code of Hammurabi it was restricted to those of equal social rank. Between different ranks monetary compensation was allowed. If a freeman destroyed the eye of a freeman, then he also lost an eye. If however the victim was a plebian then the freeman paid one mina of silver. If the victim was a mere slave then he paid the owner half the slave's value. Compensation by money gradually became accepted between social equals too. This pattern existed from Roman to Anglo-Saxon times and detailed tariffs were evolved (Siegerist 1944, Diamond 1971).

Some right to sue for compensation existed in Roman Law and the earliest Canon Law. In those countries where the legal system was based on Roman Law a workman could claim compensation for accidental injury against an employer or fellow employee. This took the form of civil litigation and was based on identifying someone who could be blamed for the injury. This continued during the early stages of the industrial revolution but the right to sue was limited and in practice was difficult and expensive. Indeed there is no recorded case of an employee successfully suing his employer for a work injury in the English High Court before 1836 (Bartrup & Burman 1983). It depended on proof of negligence but was invalid if there had been any contributory negligence. Nor was a claim allowed if the accident was due to the "ordinary risk" which might be expected in the course of the employment or if it was due to an Act of God. This was compounded by the "fellow-servant" doctrine accepted in the English courts in 1837 and ratified by the House of Lords in 1858. This meant that an employer was not responsible for negligence on the part of another employee or "fellow-servant". This law caused great distress among the workers of the day. Even more unjust was the statute which existed until: If someone died as the result of an accident then there was no case for negligence as the case closed with the death of the plaintiff.

During the 19th century there was growing awareness of the social responsibility to provide care for the sick and disabled. War pensions for disabled soldiers had existed since Greek times but now similar provision was made for "the wounded soldiers of industry" (Fitzwilliam 1904, Bartrip & Burman 1983). The turning point came with the building of the railroads. In 1825 the world's first passenger railway carriage on the Stockton to Darlington line bore the inscription "a public service free of danger". But the rapid and uncontrolled expansion of the railways led to serious injuries to railway workers and passengers on a scale unprecedented except in wartime. By 1872 in Britain alone 1145 people were reported killed and 3038 injured while working or travelling on the railways. Public anxiety about the number of accidents led to legislation. When the Berlin-Potsdam railway opened in 1838 the Prussian Government made the railway companies legally responsible for any accidents. In England the Fatal Accidents Act of 1846 first gave the right of compensation to the family of a person killed in an accident. The Employers' Liability Act of 1880 went some way to abolish the "fellow-servant" doctrine and established employers' liability. It introduced compulsory insurance though it remained possible for both parties to contract out. Fault still had to be proved and this limited its usefulness. By 1886 Employers Liability Assurance Corporation had 10217 accidents notified of which 76% made no claim and only 12% received any compensation (Bartrip & Burman 1983).

The limitations of this system led to schemes which could provide compensation without redress to the courts. The Workman's Compensation Act of 1897 made insurance compulsory for large groups of workers, regardless of fault. By 1906 all workers were covered and industrial diseases as opposed to industrial accidents were also included. In 1911 Lloyd George introduced the first comprehensive compensation scheme. Compulsory state insurance now covered both injury and, for the very first time, sickness also. This heralded the start of the Welfare State. Financial provision for disability increasingly became a matter of social provision by the state. The right to civil litigation for additional compensation remained but from now on state benefits provided an

increasing proportion of support for the sick and disabled. This culminated in the series of post-war legislation of 1946-48 which established a fully comprehensive National Health Service and Social Security for the sick and disabled as a matter of right. America was slow to follow the European example in workman's compensation. Although introduced in New York State in 1910 it was not until 1949 that all States had workman's compensation legislation. In general it followed the pattern of the British Workman's Compensation Acts.

These new laws led to a spate of legal activity and medical interest. Many of the injuries were severe and fully justified compensation (Bartrip & Burman 1983). But the problem soon arose of large numbers of claims for trivial injuries. Some of these claimants presented a host of what would now be regarded as psychosomatic symptoms in the absence of much external evidence of injury. The problem was compounded by the limitations of medical examination. "Lawyers and judges appear to have a pretty generally formed opinion that a doctor's statement concerning disability of the lower back is largely a matter of guesswork" (Wentworth 1926). As legislation extended the scope of compensation so the scale of the problem increased. By 1915 King in New Orleans could write that "pain in the back as a result of injury is the most frequent affection for which compensation is demanded from the casualty company". He summed up the dilemma neatly. "Lumbago is a condition of most frequent occurrence; the labourer however seldom suffers from the pain of lumbago but is a frequent victim of pain in the back due to injury". This does not necessarily imply that the sufferer was consciously fabricating his story. "It is easy to trace the mental process of a patient who, after a hard previous day's work, honestly concludes that the lumbago of today had its origin in the employment of yesterday. Such an individual is scarcely a malingerer, but rather the victim of a false conception, the more deep rooted often because of tactless disputes at previous examinations" (Conn 1922). Wentworth summed up what has since been echoed by many doctors involved in such cases: "exaggeration is as common as malingering is rare" (Wentworth 1926). Doctors still face the problem of deciding how much low back disability can be explained by physical disorder.

Illness behavior

Disability is restricted function. It is a question of what the patient can or cannot do and this depends on the patient's attitudes and beliefs. Disability is ultimately a form of behaviour and it depends on psychological factors just as much as on physical disease.

Since before the time of Plato most philosophers and many doctors have believed that the relationship between mind and body is of fundamental importance to human existence and to medicine. "So neither ought you to attempt to cure the body without the soul. For part can never be well unless the whole is well" (Plato). By 100 AD Rufus of Ephesus saw the need for a complete clinical assessment: "and I place the interrogation of the patient first, since in this way you can learn how far his mind is healthy or otherwise; also his physical strengths and weaknesses, and get some idea of the part affected". Stahl (1660-1734) was one in a long line of doctors since Hippocrates who took this view. He felt that the new physical sciences were not enough in themselves to explain man's behaviour. His work has a surprisingly modern ring (Greenwood & Smith 1934):

- The essential unity of the organism.
- The personal element in liability to illness.
- The part played by mental conditions in causing mental and physical disease.
- Emotional life cannot be overlooked in treating patients and is independent of reason.

Such holistic ideas were however overwhelmed by the mechanistic approach of modern medicine. Descartes (1596–1650), the foremost philosopher of the European Renaissance, divided human existence into mind and body. Medicine concentrated on the body. Pain was seen as a simple warning signal of disease. "A pain, an ache, a discomfort - these are the common complaint of those who seek the doctor's help. Pain issues a warning with kindly intent. She calls to action and, pointing the way, brooks no delay. And so the ancient (*sic*) cycle is served, from pain to cause, to treatment to cure" (Penfield 1969). Haller (1707–1777) founded modern physiology and this led to the idea that illness was simply a matter of disordered physiology. His concept of nerve excitability or irritability was to lead directly to Brown's spinal irritation and Charcot's grande hysteria which later caused so much havoc in England and France respectively (Culpin 1957).

We have already seen that Brown's (1828) concept of spinal irritation profoundly affected medical ideas about back pain. It began our modern approach to the spine. But by concentrating entirely on physical disease it also introduced a bias which has continued to

the present day. Brown described a syndrome affecting mainly young women. They had spinal tenderness, pain in the left breast and many other vague bodily symptoms. The physical pathology of spinal irritation was never clearly defined. As early as 1841 Valleix suggested that the symptoms were hysterical and the syndrome was increasingly recognised to be psychosomatic. Spinal irritation as a diagnosis disappeared as opposition grew (Valleix 1841, Mayer 1849, Skey 1868). By 1876 Ziemessen in his Cyclopaedia of the Practice of Medicine could state that "it has almost passed from the memory of the present living generation of physicians". The striking aspect of the story of spinal irritation is how vague clinical features gained such ready medical acceptance as a physical pathology. Even today many doctors seem to be uncomfortable dealing with psychosomatic problems and determined to find a physical diagnosis, however unlikely, for the vaguest symptoms.

There can be few more distressing episodes in the history of back pain than the condition known as Railway Spine. It was described and named by Erichsen (1866). It brought together the spate of railway accidents, the new compensation laws and Brown's concept of spinal irritation. Erichsen maintained that minor railway injuries to the spine could have far reaching effects not obvious at the time of the accident. Once again he accepted as physical a host of psychosomatic symptoms. Controversy over the nature and indeed the existence of this condition raged for many years in medical and legal circles (Syme 1867, Paget 1875, Jordan 1881). In fairness some of the cases may have been undiagnosed fractures but most were much more doubtful. Protagonists for the condition thought that it was due to "Concussion of the Spine" (Erichsen 1882), a term which was used in the USA and later in UK as railway spine fell into disrepute (Hodges 1881, Ziemssen 1878). Increasingly the new diagnosis became accepted especially by litigants who associated it with minor trauma. This spread from the railways to other forms of work, travelling or domestic accidents. Contradictory attempts to explain the pathology of the condition ranged from hyperemia (Ollivier 1837) to anemia of the spinal cord (Hammond 1881). With general acceptance of high speed travel, improved clinical examination and the introduction of x-rays, the diagnosis of railway spine gradually faded. But before it disappeared Erichsen's railway spine caused great confusion (Culpin 1957). And like spinal irritation some of its concepts endured. The idea that minor trauma singly or cumulatively could induce severe and chronic low back pain and disability became accepted in both medico-legal and lay circles.

The medical profession's struggle with these problems coincided with the growth of psychology and psychiatry. By 1900 terms such as railway spine and concussion of the spine had been largely discredited. They were no longer regarded as purely physical diseases but were generally felt to be hysterical. It is now nearly a century since Freud reaffirmed the importance of psychological factors in medicine and showed that psychoneurotic symptoms could be assessed clinically to provide insight into emotional processes (Freud 1959). Indeed it has been argued that psychiatry's greatest contribution to medicine has been to show how psychosocial factors affect the course and outcome of every illness, physical as well as mental (Meyer 1917). Since that time there has been increasing recognition that human illness in general and low back disability in particular can only be fully understood and successfully managed by a biopsychosocial model of illness (Engel 1977).

Since the time of Aristotle it has been recognised that man is a social animal who lives and acts—and falls ill—in a social relationship with other human beings. Halliday (1937) was one of the pioneers of modern social medicine who saw that "illness is a mode of behaviour of a person or a community. It is the person not the organ that is ill". Parsons (1951) was the first sociologist to analyse illness systematically as a social phenomenon. Mechanic developed a more practical and clinically useful concept of illness behaviour (Mechanic & Volkart 1960)—observable actions and conduct which express and communicate the individual's own perception of disturbed health. Illness behaviour is normal but it depends on the patient's own attitudes and beliefs about the illness. And some patients develop abnormal illness behaviour which is out of proportion to the underlying physical disorder and more readily attributed to associated cognitive and affective disturbances. This review has shown how our understanding and management of backache has changed. These ideas about backache unavoidably help to shape patients' own attitudes and beliefs and so in turn influence illness behaviour and low back disability.

Isolated examples of what appear to be abnormal illness behaviour in patients with low back pain can be found from the time of Hippocrates (Walser 1969), in Arabian medicine (Brown 1921) and from the beginnings of modern medicine (Heberden 1816). It first appeared as a widespread problem with spinal irritation and railway spine.

Fibrositis as an example of medical thought

The story of fibrositis (Hadler 1986) is an attempt by physicians to present rheumatism in modern pathological terms. It also illustrates the conflict between a mechanistic and a biopsychosocial approach to back pain.

By the start of this century rheumatism was clearly divided into articular and muscular rheumatism. Articular rheumatism could be classified into a number of discreet physical pathologies which allowed logical and specific treatment. It was naturally hoped that the same could be done with muscular rheumatism and backache. The story of fibrositis is about our attempts and failures to achieve this.

A nodular form of muscular rheumatism was first described in 1816 by Balfour. But the term fibrositis was only introduced by Gowers in a lecture on lumbago in 1904 to describe this clinical entity of nodular rheumatism. When the pathologist Stockman (1904) described inflammatory changes in these nodules the diagnosis gained popularity. Since that time the term and diagnosis of fibrositis has continued to enjoy intermittent popularity in both Britain and America.

In 1940 however Collins reviewed Stockman's original specimens with further material of his own and suggested that the pathological findings reported by Stockman were vague and non-specific. Since that time a whole series of hypothetical pathologies has been proposed as the basis for clinical nodules - from herniation of fat lobules to myofasciitis to interstitial myofibrositis. But no convincing pathological evidence has ever been produced. Initial reports of histological, histochemical and EMG findings have never been confirmed. Gradually it has been conceded that fibrositis is not a discreet pathological entity.

By the late 1930s Halliday (1937, 1941, 1948) began to question the diagnosis of fibrositis in a series of critical papers. He pointed out that many of the clinical features were psychological in nature and that the whole clinical syndrome had many of the features of a psychosomatic disorder. Indeed many of the clinical findings would today be recognised as illness behaviour. Halliday felt that clinical evaluation of these patients must include psychological assessment. There was at one time a temptation to dismiss the syndrome as purely psychogenic rheumatism. But when the pendulum of medical fashion settled it was generally accepted that psychological factors were important but that psychological factors alone could not explain all the clinical features. Fibrositis was best regarded as psychosomatic in the original sense that it was a syndrome in which both physical and psychological features were important.

As the discreet disease and psychogenic rheumatism theories fell into disfavour, fibrositis increasingly became a clinical syndrome. The key clinical features were nodules and trigger points. But as the pathological basis of nodules was questionned it was gradually conceded that the clinical finding of nodules was equally variable and indeed not even necessary for the diagnosis. The emphasis changed to trigger points. These were now clinical rather than pathological findings and the key feature was point tenderness. Unfortunately both nodules and trigger points had low reproducibility between observers and were very common in normal subjects. So fibrositis today consists of a clinical syndrome of subjective aching and stiffness, localised tender points, emotional symptoms and negative investigations (Smythe 1972). All of these features are common in normal subjects, unreliable, over-sensitive and non-specific. The paradox is that despite these criticisms we can recognise a group of patients with these clinical features and a very real illness. They just do not fit into a neat diagnostic category such as fibrositis.

The controversy about fibrositis is neatly illustrated by two conflicting papers in World War II. Hutchison (1942) uncritically attributed most low back pain in British soldiers to fibrositis. Boland & Corr (1943) reported a similar series of American soldiers but tried to distinguish physical and psychological features. They directly contrasted their findings with what they regarded as Hutchison's simplistic diagnosis of fibrositis.

Fibrositis has now become much less popular as a diagnosis. Coincidentally, physicians have had a diminishing influence on the management of backache. But the controversy between a purely physical and a biopsychosocial approach to backache has continued to the present day. Doctors and patients with a mechanistic view of disease seek a physical diagnosis for every clinical symptom. Others with a more holistic view recognise that illness depends just as much on psychological and social factors as on physical disease. These perspectives are fundamentally different with far reaching effects on treatment.

Low back pain and disability since World War II

Low back pain is not new. Backache and sciatica have affected man throughout recorded history and probably long before. There is not even any evidence that a symptom which affects most people at some point in their life is any more common in recent times. What is new is chronic low back disability due to simple backache. There were probably isolated cases in earlier times. But it only became a common problem in the nineteenth century and has increased dramatically since World War II.

Low back disability, in the sense that we mean it today, is a product of our industrial society. It is closely linked to modern patterns of work and compensation. The earliest reports came after the introduction of the railways. Industrial back pain and disability spread to affect most other industries in the first two decades of this century. Between World War I and World War II more and more people were affected and the duration of disability also increased. By World War II the problem was fully established and most of the causes of our present epidemic were already acting.

If there has been no change in backache then the change may be in how backache has been understood and managed. Since about 1800 simple backache changed from being a symptom to become a disease. It became a medical concern for which a medical answer was expected and offered. The pain was localised to the spine and then to the lumbosacral spine, and backache and sciatica were linked. A mechanical answer was sought. From railway spine to disc rupture, our perception of backache changed from a rheumatic condition to back injury. For 150 years, from spinal irritation to degenerative disc disease, medical ideas have also made backache appear a progressively more serious disease. This has been compounded by increasing medical emphasis on pain. Medicine has always dealt with pain as one aspect of human illness. But only in recent years has it been claimed that relief of pain is the primary social role of the physician (Engel 1959) and the unrealistic expectation has arisen that medicine should provide relief of all pain (WHO 1976). Chronic pain has even come to be treated as a disease in its own right (Social Security Commission 1986).

Since World War II all of these ideas have come together. Since then there has been a great expansion of health care and easier access to medical treatment has been coupled to higher expectations of what medicine can achieve. Orthopedic practitioners had first become interested in backache and began to apply orthopedic principles to its treatment during the nineteenth century. But not till after World War II when orthopedics expanded as a speciality and took over the routine care of trauma was the orthopedic principle of therapeutic rest accepted by the remainder of the medical profession and put into widespread clinical practice. This was supported by better social provisions which provided much needed support for those who were seriously disabled but also made possible chronic disability due to simple backache. Orthopedic surgeons by their very nature have emphasised the role of surgery which has unquestionably helped many patients. But failed back surgery has also created many chronic back cripples. More fundamentally, the hope of a surgical final solution has helped to fuel unrealistic expectations while diverting medical resources from solving the real problem of backache. Tragically, despite the best of intentions to relieve pain, our whole approach to backache has been associated with increasing low back disability. Despite a wide range of treatments, or perhaps because none of them provide a lasting cure, our whole strategy of management has been negative, based on rest. We have actually prescribed low back disability!

Modern medicine has not solved the problem of backache (Waddell 1987). Instead changed patient attitudes and expectations, changed medical ideas and management and changed social provisions have all combined to cause low back disability.

"First, do no harm" (Hippocrates), but at the same time "it ill behoves the skilled physician to mumble charms over ills that crave the knife" (Sophocles). The history of back pain shows the difficulty of striking a balance. Backache causes great human suffer-

ing which rightly demands our help. It is our job to treat back pain. And diagnosis and treatment of back pain must be improved. But our whole strategy must be to relieve pain in order to help patients to get on with their lives. If this historical analysis is correct, chronic low back disability is not an inevitable consequence of simple backache but is due to changes in how we have understood and managed back pain. It can only be prevented by a combination of more realistic patient attitudes and expectations, better medical understanding and treatment and social support which provides help for the seriously disabled but promotes recovery in those with simple backache. We all want a cure for backache. But first we need a new approach to backache and low back disability.

Abstract and Acknowledgements

Abstract

This review of low back pain and sciatica over the past 3500 years tries to put our present epidemic of low back disability into historical perspective. Backache has affected human beings throughout recorded history (Table 1). What has changed is how it has been understood and managed. Two key ideas in the nineteenth century laid the foundation for our modern approach to backache: that it came from the spine and that it was due to injury. Backache had always previously been considered a rheumatic condition. Only from that time were backache and sciatica considered and treated together. Their management was increasingly dominated by the new orthopedic principle of therapeutic rest.

What is new is chronic disability due to simple backache. Apart from rare cases, this only began to appear in the late nineteenth century. It escalated after World War II. It appears to be closely related to changed understanding and management of backache: specifically to the idea that backache is due to serious spinal injury or degeneration and to medical prescription of rest. This is reinforced by the improved social support which makes rest possible.

Sadly, we must conclude that much low back disability is iatrogenic.

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Table 1

Date	Backache	Sciatica
2000		
1500	150 Edwin Smith papyrus —case presentation	
1000		
500		≈400 **Hippocrates** —clinical description
BC 100		
0		
AD 100		
	150 **Galen**	≈150 **Aretaeus**—nervous
200	—symptom of disease	—arthritic
	—"fleeting pains" of	
500	joints and muscles	
1000		
1500		
	1681 **Sydenham**	
	—rheumatism	1764 **Contunnius Domenicus**
1800		—modern clinical entity
	1828 **Brown**—spinal irritation	
1850		
	1866 **Erichsen**—railway spine	
	Thomas—orthopedic surgery	
	therapeutic rest	
1900		
		1934 **Mixter & Barr**
		—disc rupture
1950	Degenerate disc disease	—disc surgery
	Chronic pain syndrome	

Date	Disability	Illness behavior	Compensation
2000			
			≈1750 Code of Hammurabi
1500			
1000			
			≈800 ius Taliones
500		**Hippocrates**	Military pensions
			Roman Law
BC 100			
0			
AD 100			
200			
500			
1000		Arabian medicine	
		—isolated case presentations	
1500			
	1705 **Ramazzini**—occupational		
1800	back pain	1816 **Heberden**	
		1828 Spinal irritation	
			1836 First personal injury case in English High Court
			1846 Fatal Accident Act
1850			
	1866–80 Railway spine	1866 Railway spine	
		1880 **Freud**—psychological	1880 Employer's Liability Act
		medicine	1897 Workmen's Compensation Act
1900			—compulsory insurance
	1900–20 Industrial back pain	1910 Medicolegal assessment	1911 National Health Insurance Act
			—state insurance for injury and sickness
	1930 First population morbidity statistics		
1950	Post WWII-epidemic of		1948 National Health Service and
	low back disability	1960 Mechanic-illness behavior	comprehensive social security
	Chronic pain syndrome		

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