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PROGNOSIS IN CONSERVATIVELY
TREATED SCIATICA

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PREFACE

Sciatica is a disease characterised by radiating pain in the posterior and/or lateral aspects of the leg or legs. It is usually combined with back pain — lumbago-ischias.

Two forms of the disease have usually been recognised, a “symptomatic” type and an “idiopathic” type. The former group consists of cases in which the symptoms of sciatica are secondary to some known disease such as intraspinal tumours, vertebral metastases, tuberculous spondylitis, malignant tumours and inflammatory processes in the pelvis or femur, thus cases in which an expansive or inflammatory process encroaches upon the nerve trunk or its roots and thereby causes sciatic pain.

Several different types of diseases have been suggested as a cause of “idiopathic” sciatica. Thus, pathologic conditions of osseous and cartilaginous tissue or muscles are supposed to involve the sciatic nerve or the nerve roots, resulting in disorders of the function of the nerve.

According to our present knowledge of “idiopathic” sciatica, a disc protrusion is the most common cause.

During the last two decades the literature on the results of surgical treatment of sciatica due to disc protrusion has been much more abundant than that on the prognosis of conservatively treated sciatica.

It seems that during the last few years the enthusiastic belief in operative treatment as the only effective measure against sciatica due to disc protrusion has been decreasing. Although a discussion of these factors lies beyond the scope of this study, mention might be made of such causes as failure to locate the lesion, subsequent further retropulsion of nuclear tissue, root damage during the operation, post-operative adhesions, subsequent prolapse of previously healthy discs. And even if recur-

rences are said to be less common after operation than after conservative treatment, it is undeniable that recurrences also appear after operation. It might be mentioned that the frequency of such recurrences has increased to such an extent that KELLEY *et al.* (1954) of the Mayo Clinic studied the results achieved in patients who subsequent to two unsuccessful operations for protruded intervertebral disc were treated by conservative measures or underwent a third operation.

The literature does not contain any detailed long-term investigation of the clinical course of conservatively treated, clear-cut cases of sciatica with neurologic signs.

The purpose of this study is to investigate the prognosis in conservatively treated sciatica. Some problems were found to be of special interest. Is the prognosis, for instance, influenced by such factors as heavy manual work or age at onset? What is the frequency of recurrence and is it influenced by different factors? It was also considered of interest to investigate the condition from a medico-social point of view, — number of hospital days, duration of the disease, effect on working capacity.

The present material consists of 310 patients who at the time of hospitalisation had neurologic signs.

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I. HISTORICAL

The name *sciatica* is derived from the Greek *ischion*, which first meant the hip-joint, but later came to be applied to the lowest of the three parts of the *os innominatum*, the bone on which the body rests when sitting.

Pain in the region of the sciatic nerve was called *sciatica passio* by Trevisa as far back as 1398. *Shakespeare* refers to it more than once; in *Measure for Measure* the question is asked: "How now, which of your hips has the most profound sciatica", and in *Timon* we read the exclamation: "Thou cold sciatica, cripple our senators, that their limbs may halt as lamely as their manners."

The Italian COTUGNO (1764) was the first to give a detailed description of the condition. In his paper *De ischiade nervosa commentarius* he distinguished two types, which he termed *ischias arthritica* and *ischias nervosa*. He ascribed the latter type to a distension of the neurilemma due to edema.

A hundred years later LASÈGUE (1864) questioned whether the pain might not be of myalgic nature, but was at the same time more inclined to conceive the condition as a nervous disease.

This question whether the origin of the disease should be sought in the muscles or in the nervous system was then the subject of debate and gave rise to various theories. Thus the Dane, HELLWEG (1920), put forward the theory that sciatica is a *myopathy* due to muscular hyperfunction. INGVAR (1936) shared HELLWEG's opinion that sciatica should be conceived as a *myopathia e labore*. On the basis of temperature recordings he believed that the myalgia is associated with disturbances of the circulation of the blood in the muscles, and he questioned whether over-strain might not be capable of causing auto-intoxication of the muscles concerned with consequent ischemia and

pain, just as the pain of angina pectoris is caused by ischemia of the heart muscle.

PETRÉN (1908) claimed that the disease should instead be regarded as a neuralgia, or in the event of sensory loss, as neuritis, and he believed the cause to be primary myitis of the medial gluteal muscle, but he also stressed the importance of the piriformis muscle because of its close relationship to the nerve. According to him, the inflamed muscles produced sciatica both by pressure of the nerve and by an encroachment on the nerve trunk, down which it sometimes spread. JANSEN (1926) also believed that sciatica was a type of neuralgia due to muscular affection in the region of the loins and buttocks and that the commonest cause was acute or chronic traumata ("sprains" and "strains") in these muscles or local exposure to cold.

LINDSTEDT (1922, 1936) conceived the disease as neuralgia due to various painful and irritating conditions in those muscles whose type and localisation permit radiation of pain to the sciatic area. The most important of these painful conditions, he said, arise in the muscles after "hyperfunction" due to long walking or prolonged standing. As predisposing factors LINDSTEDT gave a number of different conditions such as spondylitis, varices, knee joint affections, flatfootedness and obesity, but in addition stressed a nervous constitution as predisposing.

This conception of sciatic pain as "referred pain" is also shared by recent authors, but with the modification that the rôle of the musculature as a causal factor has been substituted by that of abnormal alterations in the osseous and ligamentous tissues. Thus SCHÖBER (1940) claimed that sciatica is pain radiated from a pathologic condition of the joints of lumbar vertebrae, from the sacro-iliac joints and the hip joints. According to BADGLEY (1941), 80 per cent of all cases of lumbago-ischias can be classed under the heading of referred pain. He expressed the opinion that since the capsule of the intervertebral joints is innervated, irritation there may produce a pain stimulus, which can cause referred pain corresponding to the sciatic area. INMAN & SAUNDERS (1944) assumed that injury to

deep mesodermal structures (*e. g.* periosteum, ligaments) can by some reflex mechanism cause radiation of pain to regions corresponding roughly to the segmental innervation of this structure, and they termed the corresponding segments *sclerotomes*. Like BADGLEY, however, they admitted that neurologic disorders indicate root injury.

Most authors, however, are inclined to conceive the disease as an affection of purely neural nature, a "nervous inflammation", due to endogenous or mechanical factors.

Infections and intoxications have been described as possible etiologic factors. DEJERINE (1912), for example, who shared the opinion put forward already at the turn of the century by LORTAT-JACOB & SABARÉANU (1904) that in certain cases sciatica is of radicular origin, claimed that in the majority of cases this "sciatique radiculaire" is due to syphilis. Other causes, given commonly in medical textbooks, of inflammation of the sciatic nerve, are diabetes, pernicious anemia, gout, influenza, common cold, chronic alcoholism, arsenic poisoning. A common cold or influenza following exposure to cold or draught is often reported by the patient as the cause of his disease. PETTE & BECKER (1938) do not deny this possibility when they state that a virus infection of the spinal ganglia of the lumbosacral roots can be a cause of sciatica.

It appears that during the last few decades the prevalent opinion is that the genesis of sciatica can best be explained on mechanical grounds, *i. e.* that as a consequence of various pathologic conditions of osseous and cartilaginous tissue or muscles disorders arise in the function of the nerve.

According to the assumed site of the disturbance of the nerve tissue the following classification has been used: a) sciatic nerve or its branches, b) lumbosacral plexus, c) nerve roots.

THE SCIATIC NERVE OR ITS BRANCHES. — PETRÉN (1908) assumed, as mentioned, that an inflammation of the piriformis muscle could involve the nerve and thereby, as well as by direct compression, cause sciatica. Much later the latter opinion was again advanced by some authors, who thus regarded the pro-

blem from a purely mechanical point of view (FREIBERG & VINKE 1934, ROBINSON 1947). A contracture of the tensor fascia lata causing pressure against the nerve between this muscle and the piriformis muscle was considered by OBER (1936) a factor of etiologic importance.

LUMBOSACRAL PLEXUS. — It has been claimed that pressure against the lumbosacral plexus can be produced by hypertrophic arthritis of the sacro-iliac joints. In the discussion of the cause of such arthritis this opinion was first put forward by GOLDTHWAIT & OSGOOD (1905), who pointed out that the sacro-iliac joints are exposed to great strains, *e. g.* standing or prolonged sitting in marked lordosis, which favours a softening or dislocation of these joints. This therefore often leads to alterations in the form of hypertrophic arthritis with pain in the legs. These authors expressed the view that sciatica is due to pressure by the hypertrophic tissue against the lumbosacral cord, where it passes the joints.

Various degrees of instability ("dislocation", "subluxation") of the sacro-iliac joints as well as "periarthritis" and "synovitis" of inflammatory-hypertrophic nature have also been regarded as being able to irritate the nerve roots in this region (SMITH-PETERSEN & ROGERS 1926, HERTZLER 1926, YEOMAN 1928).

THE NERVE ROOTS. — If the possible lesions of the nerve root be dealt with according to its course in central direction from the plexus, the lumbosacral junction will be the first to be mentioned. Changes in and around this region have received much attention in the investigations made in the search for an explanation of sciatica on mechanical grounds. It has thus been argued that the fifth lumbar disc is the last in the flexible part of the spine and therefore exposed to heavier strains than those above and, in addition, this weight is not borne by a transverse plane but by a forwardly sloping plane, the angulation of which increases with increasing *sacrum acutum*. The lumbosacral junction has therefore been regarded as a "weak point" of the spine.

Changes in the lumbosacral junction as a possible cause of

sciatica were described by GOLDTHWAIT (1911). He reported a case — a man with intermittent pain, disturbed sensibility and paralysis of both legs. The patient was operated on by Harvey Cushing. On exploration of the lowermost section of the inter-spinal canal the only finding of interest was “a narrowing of the osseous canal at the lumbosacral junction”. This induced GOLDTHWAIT to study the mechanics of the joint between the fifth lumbar vertebra and the sacrum, and he arrived at the conclusion that the possibilities of vertebral instability are great at this level. DANFORTH & WILSON (1925) pointed out the possibility of the fifth lumbar root being exposed to injury at the lateral margin of the joint between the fifth lumbar vertebra and the sacrum.

The rapid strides made in the field of roentgenology during the last few decades increased the possibility of detecting anomalies or defects in the lumbar spine, such as partial lumbarisation or sacralisation, laminar defects, spina bifida, articulating transverse process, spondylosis and spondylolisthesis. It is hardly astonishing that such changes have been considered a possible cause of lumbago and sciatica. MEYERDING (1941) found spondylolisthesis to be common among patients with sciatica, but he was inclined to ascribe this to the assumption that patients with spondylolisthesis are more disposed to protrusion of the intervertebral disc than those without such spinal instability. According to him, forward slipping of the fifth lumbar vertebra cannot by itself cause injury to the nerve roots. This view was not shared by BARR (1951), who claimed that spondylolysis and spondylolisthesis can cause root compression either by direct pressure upon the posterior portion of the root in the region of the defective articular facet or in some cases of spondylolisthesis by longitudinal tension in the roots. GILL *et al.* (1955) found at operations on cases with spondylolisthesis with radicular symptoms consistently nerve root compression by a mass of fibrocartilaginous tissue at the defect in the *pars interarticularis* of the fifth lumbar vertebra.

The term *neurodocitis* was suggested by SICARD (1918) in an attempt to direct attention to the significance of the interverte-

bral foramina in the development of sciatica. SICARD classified sciatic neuralgia topographically as neuralgias due to lesions of the posterior nerve root in the theca, "radiculitis"; or between the posterior root ganglion and the origin of the nerve plexus, "funiculitis"; or of the plexus or the nerve trunk itself. SICARD stressed especially the pathogenetic importance of funiculitis, and as the condition arises in the intervertebral foramina, he suggested the name neurodocitis to indicate an inflammatory process in the osseous canal with secondary involvement of the nerve root.

The same opinion, namely that sciatica is due to an affection of the nerve root at a level prior to its entry into the sacral plexus, was expressed in Sweden by HEÜMAN (1920) and above all by STENSTRÖM (1931), who assailed the myopathic theory widely accepted in the nineteen-twenties and thirties in Scandinavia and claimed that only an affection of the nerve root itself could explain the neurologic signs associated with sciatica. PUTTI (1927) was also convinced that an affection of the nerve root was the cause of sciatica. He believed that such an affection could develop secondary to pathologic conditions of the intervertebral joints. FEILING (1928) shared the view of SICARD and of PUTTI and stated that he had found a selective incidence of pain in the region supplied by the fifth lumbar nerve.

Anatomic studies of the diameters of the lumbar intervertebral foramina have produced evidence of the possibility of the nerve roots being compressed there (DANFORTH & WILSON 1925, FRIBERG 1941, MAGNUSON 1944, LINDBLOM & REXED 1948).

It is interesting that the first reports of protrusions of disc tissue into the spinal canal appeared as far back as nearly a hundred years ago. These protrusions were casual postmortem findings, but none of the authors suggested their relation to sciatica. In his monograph "Die Halbgelenke des menschlichen Körpers" von LUSCHKA (1858) described the change he found in a horizontal section of a lumbar intervertebral disc as follows: "Es ist eine sehr umfängliche Höhle bemerklich, welche sich nach hinten zu einem Kanale verlängert, der in der Mitte

der hinteren Seite der Knorpelscheibe ausmündet. Durch ihn ist eine Fortsetzung des Gallertkernes in den Wirbelkanal unter das Lig. longitud. postic. hereingewuchert." He pointed out the possibility of the medulla being compressed by such a formation.

Some 40 years later KOCHER reported on a man who had fallen on his feet from a considerable height. Postmortem examination revealed a rupture of the first lumbar disc with dislocation of the contents of the disc into the spinal canal but without injury to the spinal cord.

MIDDLETON & TEACHER (1911) described a case in which intense pain in the legs suddenly occurred while the patient was lifting a heavy load. Paraplegia soon developed. He died two weeks later from a urinary tract infection. The pathologist reported spinal cord injury due to a mass of the pulp of an intervertebral disc which had been dislocated into the vertebral canal.

The neurosurgical literature of the nineteen-twenties contains several reports of "fibrochondromas" and "ecchondroses", arising in various vertebral discs and causing compression of the nerve elements. These findings were made at operations because of suspected spinal tumours (ADSON & OTT 1922, ELSBERG 1931). In retrospect, these "tumours" were probably simple disc herniations, the nature of which had not been realized at that time. Of special importance for the further elucidation of the problem were the investigations made around 1930 by SCHMORL and co-workers, which contributed considerably to our knowledge of the anatomy, physiology and roentgenographic changes of the intervertebral discs. In 1927 SCHMORL described ruptures of the nucleus pulposus into the spongiosa ("Knorpelknötchen") and two years later ruptures of the nucleus pulposus backward into the spinal canal ("hintere Knorpelknötchen"). He did not, however, suggest them to be of importance as a cause of sciatica.

In 1929 DANDY reported on two patients operated on because of sciatic pain and compression of the cauda equina and ascribed the compression to "loose cartilage from intervertebral disc

simulating tumour of the spinal cord". At that time he thought that the lesion might be analogous to *osteochondritis dissecans* but especially pointed out that the disease might offer a pathologic basis for cases of "so-called sciatica".

In Sweden the first case of sciatica due to a ruptured disc was published by ANTONI (1931). The patient had been operated on in 1929 by Herbert Olivecrona.

In 1934 MIXTER & BARR drew general attention to the condition by their report of 19 operated cases. They convincingly showed that a ruptured disc can compress the nerve roots in the lumbar region and thereby cause sciatica. Their communication became the basis of the gradually accepted conception that protrusion of the disc is the commonest cause of what had earlier been called "idiopathic" sciatica and since then a large number of papers bearing on this subject have been published.

Reports of the results of surgical treatment are numerous and the sizes of the operated series as well as the duration of the follow-ups have increased to such an extent that it has become possible to judge the value of surgical treatment fairly well. As early as 1940, LOVE & WALSH of the Mayo Clinic reported on 500 cases, and in 1947 on 1,270 cases (LOVE) and in 1946 FRIBERG reported on 700 cases from the Orthopedic Clinic, Karolinska Sjukhuset, Stockholm.

Comprehensive clinical studies based on operated cases have been published by the Dane MALMROS (1942), the Finn WARIS (1948) and the Norwegian RÖVIG (1949).

In Sweden various neurologic, roentgenologic and orthopedic problems bearing on the condition have been elucidated by SAHLGREN, NORLÉN, KNUTSSON, LINDBLOM, LINDGREN, and WIBERG. Special mention should, however, be made of the valuable contributions by FRIBERG and HIRSCH on various aspects of the disease.

Is sciatica always due to local affection of the root or nerve? This question was posed by SAHLGREN (1942). His answer, based on the clinical analysis of 100 cases, was that it is not proved that those cases of sciatica in which clinical radicular

symptoms could not be demonstrated were not of radicular origin. It is further established, he said, that whether typical sciatica can arise in any way other than by local affection of the root or nerve can at present neither be denied nor proved. KEEGAN (1944) who especially studied sensibility disturbances in sciatica says that "signs of organic loss of nerve root function, by the finding of sensory or reflex loss, necessitates the location of causative pathologic changes directly on that nerve root and does not permit the interpretation of reflex pain from some distant region". STEINDLER (1947) gives the following diagnostic implications: "The diagnosis of a protruded disc should be made if neurological signs are present and if the history and other complaints substantiate it. In fact, when a proper history and corresponding physical examination disclose so-called neurological signs, we do not look for a further test for the diagnosis." MILLIKAN (1951) says: "Lesions of nerve roots cause more than 95 per cent of all cases of sciatica, and more than 90 per cent of these radicular lesions are protruded intervertebral disks."

This opinion is supported by FALCONER, MCGEORGE & BEGG (1948), who studied two groups of cases with sciatica comparable as to histories and signs. One group (86) was operated on and the other (76) was treated conservatively. All of the cases were examined myelographically according to the same technique. Myelographic evidence of disc protrusion was seen in 88 per cent of each group. At operation protrusion was seen in all 86 cases except one. They therefore concluded that in the conservatively treated series, too, the symptoms were due to disc protrusion in practically all of the cases.

Nevertheless, many reports of operated series describe a varying number of cases in which surgical exploration revealed no signs of a ruptured disc.

According to DANDY (1941), such a negative result of the operation can be due to a "concealed disc", which means that only a slight soft protrusion of the disc is present which can be readily missed at operation. FALCONER (1948) describes what he calls "intermittent prolapses". He says that such a pro-

lapse appears only when the lumbar spine is extended and disappears when the spine is bent forward, thus in a position in which the spine is usually placed at operation.

Another factor that has been the subject of much discussion is the significance of the ligamentum flavum. The German GRILL (1950), however, points out the lack of histologic evidence by those authors who claim that hypertrophy of the ligamentum is sufficient by itself to cause compression of the root. GRILL says that only in a very limited number of cases does the microscopic picture permit conclusions as to the presence of pathologic processes here and that especially the thickness of the ligament is not with certainty of etiologic significance.

After all, it might be said that the clinic of sciatica is hardly completely explained by knowledge of disc protrusions. The question, for example, has been raised as to how one can explain recovery by conservative therapy despite the persistent myelographic defects suggesting unchanged protrusion of the disc. Or how shall one explain the not uncommon mild sequelae appearing only in connection with heavy work or with a common cold, etc.? Fully convincing explanations for these problems have obviously not yet been given, although some tentative explanations and theories bearing on these problems have been offered. Readers interested in a survey of these works are referred to SÖDERBERG (1955).

II. THERAPY

The therapeutic measures that have been suggested in the conservative treatment of sciatica are both many and different.

How the different therapeutics act upon the disease is not known, but experience has shown that the symptoms respond particularly favourably to some methods of treatment. To what extent they influence the course of the disease as a whole is at present not known.

The measures most widely used are:

BED-REST. — During the acute stage of lumbago-ischias complete bed-rest has proved the most important therapeutic measure. Greatest comfort seems often to be secured when the lumbar spine, hips and knee-joints are slightly flexed, a position readily obtained by placing pillows under the upper part of the back and head and under the knees. Such a position can be regarded as comparable to the relieving slightly kyphotic posture often assumed by patients when they are standing. Some patients, on the other hand, feel better on a flat firm mattress, possibly with a pillow under the lower back. Sometimes, however, neither of these positions gives appreciable relief and SYMONDS (1949), for example, claims that no strict rules should be prescribed as to what position the patient should be placed in but that he should lie in bed “in whatever position he finds most comfortable”. This view might appear correct, because what reasonably determines the intensity of the pain in sciatica due to protruded intervertebral disc is the pressure against the nerve root and therefore, as a rule, the patient himself should best be able to decide which position gives most relief.

The fact that a patient with acute lumbago-ischias often assumes a slightly kyphotic posture in order to gain relief,

might be the basis of the method of treatment proposed by CRISP (1948). He believes that it is especially important to maintain the kyphotic posture of the lumbar spine and therefore immobilises the back in a plaster jacket in this position with subsequent bed-rest. CRISP believes that "this favours reduction of the herniation". Support for his view might be the aforementioned observation of FALCONER and co-workers made at operation of protruded discs that a bulgent protrusion could be made to disappear by flexing the lumbar spine and to reappear by hyperextending it ("intermittent protrusion").

In an attempt to still more decrease the pressure on the discs during bed-rest, continuous traction by weights suspended from the legs has also been applied (COPLANS 1953, WALCHEF 1954).

TREATMENT WITH PLASTER JACKET. — Immobilisation of the lumbar spine by means of a plaster jacket has proved valuable in the treatment of lumbago-ischias, both in the acute and in the later stage of the condition. Although PUTTI (1927) believed in a different cause of the condition, he realised the value of this treatment, and his method of applying the plaster jacket still holds today. He immobilised the patients with sciatic scoliosis without trying to correct the position of the spine. He knew that this was a "position of relief" that should be respected and that it disappeared spontaneously when the pain subsided.

The therapeutic effect obtained by bed-rest or plaster jacket might probably be decreased pressure against the intervertebral disc and thereby decreased pressure in the disc which might be of importance for the size of an actual protrusion.

MANIPULATION. — Therapeutic methods that are said to produce a direct reposition of a disc herniation are also used in the treatment of sciatica. Such methods appear to date far back in history because, judging by the literature, even *Hippocrates* is said to have described a manoeuvre for reposition in the treatment of back pain. Manipulative methods are now widely used among the chiropractors. Their system of therapeutics is evidently based on the belief that all diseases are due to abnormal

positions of the vertebrae. Apparently without really understanding what they were doing chiropractors have been applying such manipulation for years in the treatment of lumbago-ischias, often to the annoyance of orthodox physicians. However, it cannot be denied that such measures have often given good results. With knowledge of the different types of disc protrusion and of its aforementioned "intermittent" nature, similar therapeutic methods have gradually found use in orthopedic surgery, apparently especially in the United States, and in the very last few years even in Germany. The commonest method used in the United States seems to be that described by ABT-KEEGAN (1944), according to which the hip joints on the affected and healthy sides are alternately and repeatedly flexed so that the thigh approximates the abdomen followed by sudden extension of the leg. The purpose of this manipulation is to widen the intervertebral space dorsally and thereby give a "mobile" protrusion the opportunity to return towards the centre of the disc.

But also manipulative backward extension has been recommended (IDELBERGER 1949, FRANCILLON 1950, GUILIANI 1951). GUILIANI believes that by restoring the normal lordosis of the spine, the pressure conditions in the disc change in such a way that the nucleus is pushed ventrally, the posterior edges of the vertebral body approach one another and thereby "seal" the disc dorsally. Prior to these authors, VON ROSEN (1944) reported good results of manipulative extension treatment especially of such cases of sciatica with scoliosis by means of correction of the faulty posture under anesthesia with subsequent bed-rest in a plaster bed, and, as a rule, later ambulatory treatment with a plaster jacket. He did not, however, ascribe the effect of treatment to a reposition of the disc.

STODDARD (1951) claims to have had good success with manipulation — simple or rhythmical traction — carried out on a specially constructed table. In the presence of neurologic signs, he says, the degree of prolapse is such that it cannot be reduced by manipulation. MENSOR (1955) claims good results of a manipulative treatment producing rotation of the spine. BARR (1947), however, warns against manipulative methods. He says: "Al-

though manipulative procedures at times result in dramatic improvement in the acute symptoms, it seems illogical to expect any manipulative procedure to return a ruptured disc permanently to its normal position, and manipulation under anaesthesia appears to carry too great a risk to warrant recommending it."

It can undoubtedly also be said that manipulation can sometimes lead to an undesired result, namely increased root damage, possibly with serious persistent neurologic symptoms such as dropfoot.

Here it might be of interest to mention a type of therapy that has been called "forced Lasègue". Those who have conceived sciatica as an inflammation of the sciatic nerve believed in an adhesion of the nerve and the surrounding muscles and that this was the cause of the resistance offered in the examination of patients for Lasègue's sign. In an attempt to loosen these assumed adhesions the straight leg was raised to 90 degrees under anesthesia and was also often held for some time in this position by means of a specially constructed device. The method seems occasionally to have produced a strikingly good effect, but sometimes it was followed by paralysis of the foot. One might be tempted to assume that in the former case the kyphosis of the lower spine resulting from such a manoeuvre might help a protruding disc to return. In the latter case, however, this did not occur, but the distension of the nerve root occurring in association with Lasègue's sign caused still further damage to the nerve already severely pressed and stretched over a completely prolapsed disc.

MEDICINAL TREATMENT. — In the acute stage with severe pain *analgetics* and *sedatives* have been used as well as medicines regarded as having a specific therapeutic effect and varying with the different concepts of the origin of the disease. Mention might be made of *antirheumatic agents* such as preparations of bee-poison, gold salts, sulphur compounds or *fibrifacients* of foreign protein type. In addition such preparations as vitamins of the complex B, which are believed to

contain *antineuritic agents* have been used. *Spasmolytica* and peripheral *vasodilators* have also been recommended.

LOCAL INJECTIONS. — *Injections into the sciatic nerve or perineurally* of various means preferably novocain (HAGGART 1938) or large doses of isotonic saline (FEILING 1928) have been suggested. *Epidural injection* of cocaine was employed by CATHELIN and by SICARD as far back as 1901. FEILING (1928) claimed good results with 40 per cent antipyrine, but otherwise mainly anesthetics of the type novocain have been tried (CRAIG & GHORMLEY 1933). *Presacral injections* according to a method given by PENDL (1934) have also been used, especially in Germany, and are still applied today. STENDER (1951) believes such injections valuable both from a therapeutic and from a diagnostic point of view in protruded intervertebral discs and stated that these injections “may be useful in slight incomplete forms of herniation”, but that they “cannot remove or cure a ‘sciatica’ produced by a severe and advanced form of herniation”. *Paravertebral injection* of novocain in the lumbar sympathetic chain has also been recommended (BAUER & HELLSTEN 1941).

LOCAL THERMAL TREATMENT. — Various kinds of heat treatment have been used in the form of hot baths with addition of various substances, hot showers, hot mud plasters, electric warming pads, and infra red rays. Short wave and ultrasonics produce a deeper thermal effect and are therefore regarded as more effective and especially the latter has been applied with increasing frequency during recent years, particularly in Europe (KÖNIG 1950, PILLOKAT 1951, VAN WENT 1952).

PHYSIOTHERAPY. — Physiotherapy has been, and still is, used to a large extent in the treatment of lumbago-ischias. In the light of our present knowledge of the commonest cause of sciatica, however, it may often seem less advisable to give this sort of treatment to a patient in the acute stage of the disease.

On the other hand, after the acute symptoms have subsided, physiotherapy has proved valuable.

It appears to me that of the above mentioned various types of treatment only the immobilisation secured by bed-rest and treatment with a plaster jacket can be regarded as a treatment of really therapeutic value. Further, it appears that manipulation obviously can occasionally result in temporary or definitive recovery. Of other therapeutics referred to, analgetics, certain injections and various kinds of thermal treatment during the course of the disease are useful, in that they alleviate the pain. After the acute stage has passed off, physiotherapy helps to strengthen the muscles and can correct a consequent persistent malposture and mobilise a stiff back.

III. PROGNOSIS

Judging by the literature on lumbago-ischias, opinions differ fairly widely on the prognosis of cases treated by conservative methods. LASÈGUE distinguished two types of sciatica, a "sciatique benigne" and a "sciatique grave". This implies that he found some cases of sciatica to be more severe and more prolonged than others, just as we do today. LASÈGUE, and before him VALLEIX, had observed that muscle atrophy was particularly common in severe cases of the disease. By some of those who later conceived various types of sensory losses as a manifestation of a "neuritis ischiadica" in contrast to a type without sensory losses, "neuralgia ischiadica", neurologic signs also appeared to be regarded as prognostically unfavourable.

It might be of interest to mention the opinions, cited from PETRÉN (1908), of some well known authors of earlier date on the prognosis of the disease.

BERNHARDT says: "It is true that no small number of patients with sciatica make a complete recovery but still greater is the number of patients who only improve partial recovery or make recovery with defects, in that a certain stiffness and readily recurring painfulness of the leg is seen especially after strenuous exercise. If the disease is due to an inflammation of the nerve, a true paralysis or at least paresis of certain muscles can also persist."

OPPENHEIM says: "In many cases sciatica runs a favourable and rapid course and the patient makes a complete recovery within a few weeks or months. But in other cases the disease is fairly obstinate, it persists for one or several years, and then runs a fluctuating course, and even after healing there is a strong tendency to recurrence."

STRÜMPPELL stresses the usually favourable end-results: "The duration of sciatica is seldom less than a few weeks. In many cases months may pass and even years before the pain has disappeared completely."

Of English authors HERTER says: "As to the final cessation of the pain and rehabilitation of the nerve function the prognosis of a primary neuritis of the sciatic nerve is always good. The duration of the

symptoms varies widely from a few weeks in some cases to many months or a year in others. Recurrences are common among the most serious cases and may prolong the disability for one or two years. As a rule, the duration of the pain varies with the acuteness and severity of the symptoms at the onset. In many the disease lasts for several months."

GOWER states: "The prognosis of sciatica except in secondary cases due to diseases outside of the nerve, is good, as far as the final recovery is concerned, but very uncertain concerning the intensity and duration of the disease. As a rule, it can be said that these properties are proportional to one another but both can be decreased by adequate rest. Any strain liable to irritate the condition can prolong the duration of the disease by many months, and as a matter of fact recurrences may occur during the first year or two after every partial recovery."

PETRÉN (1908) himself took a bright view of the prognosis. He said: "We must bear in mind that the typical sciatica is a transitory illness, which returns according to my experience only a limited number of times and subsequently leaves the patient free from anything but possibly slight residual symptoms." His contemporary, the Dane JANSEN (1926), also stresses the favourable course of the disease: "In my opinion sciatica is a benign disease and has no tendency to become chronic."

STENSTRÖM (1931), on the other hand, took a serious view of the prognosis of the disease and claimed that the tendency to recur is great. It is possible, he says, that neurologic signs indicate a poorer prognosis, but he at the same time pointed out that he could not say anything definite on this point.

In comparison with the many reports on follow-ups of surgically treated series which have appeared during the last two decades since MIXTER & BARR's first report of such therapy, papers on the late results of conservative treatment are few.

Some authors have presented reports of conservatively treated series with and without neurologic signs at the time of the disease, others have presented the late results only of cases with neurologic signs. To the former belong EKVALL (1939), KUHNS (1941), BRAHME (1942), BOYSEN (1947), YTREHUS (1947), and ÖSTBERG (1950). The late results given by them are sum-

Table 1. *Conservatively treated series of cases with and without neurologic signs*

Author	Interval between treatment and review	Number of cases	Symptom-free		Persistent more or less pronounced symptoms		Full working capacity		Recurrence of sciatic pain	Treatment	Remarks
			Per cent	Per cent	Per cent	Per cent	Per cent	Per cent			
EKVALL 1939	4—5	74	27	73		64					
KUHNS 1941		449	79	21						Bed-rest, local heat. Physical therapy during remission not in the acute phase. Corset	
BRAHME 1942	7—11	580	63	37		88	8			Bed-rest, short wave. Injections: isotonic saline, antipyrine, histamine, bee poison. Presacral injections. Symphathetic block. X-ray	Persistent symptoms: mild in 23 per cent and pronounced in 11 per cent
YTREHUS 1947	2—8	213	34	66		71	30			Bed-rest, local heat. X-ray. (21 cases with spondylosis deformans)	Reduced working capacity owing to sciatica 26.8 per cent, not owing to sciatica 2.4 per cent
BOYSEN 1947	2—8.5	277	21	79		87	30			Bed-rest, local heat, analgetics, massage	Reduced working capacity 11.5 per cent
ÖSTBERG 1950	1—11	With root symptoms: 313 Without root symptoms: 154	19	81			19				Symptom-free + occasional slight trouble 54 per cent Ditto 65 per cent
			28	72			14				

marised in Table 1. This table might be supplemented by the following remarks.

In EKVALL's material 67 of 74 patients had neurologic signs at the onset of the disease. In his final comments on the cases he had followed up EKVALL says: "The prognosis is more favourable when treatment is started early and continued long enough, but some cases show a strong tendency to recur."

KUHNS, who was of the opinion that sciatic pain is a "referred pain" from diseases of the ligaments, muscles, fascias etc., had an optimistic opinion of the possibilities of conservative treatment to cure this supposed cause of sciatica. In cases due to disc protrusion, however, he considered conservative treatment to be of little value and that operation was indicated. Of the six cases that KUHNS classed as "pain from pressure or irritation within the spinal canal", no improvement was noted. This time KUHNS seems to be of the opinion that a ruptured disc is a very rare cause of sciatica and he obviously supposed that no more than six such cases were included in his series of 449 cases.

BRAHME found cases with loss of the patellar and achilles reflexes (14 per cent) not to be prognostically poorer than cases with normal reflexes. BRAHME's opinion of the prognosis of the disease was that "ischias may occur as a chronic illness which continues all through life, and which prevents the sick person from ever taking up his work again to the full extent".

BOYSEN reported recurrences in 30 per cent of her series but also that recurrences after 46 years were rare. She said that the duration of the illness, the analyses of the cerebrospinal fluid, and the neurologic or roentgenologic findings permit no prognostic conclusions. YTREHUS, on the other hand, considered that conclusions could be made from Lasègue's sign, which appeared to him to be related both to the duration of the disease and to the end-result of the treatment. But he, too, found a weak or absent achilles reflex (54 per cent of his cases) to be of no prognostic significance.

ÖSTBERG divided his material into cases with and without root-symptoms and compared the two groups with reference to

the prognosis. He found no statistically significant difference between them.

Clinical reviews of conservatively treated cases of sciatica claimed to be due to disc protrusion have been published by DUNNING (1946), DURBIN (1948), HENDERSON (1952), GIULIANI (1954), and HARDT (1954). Their results are summarised in Table 2. The table may be complemented by the following remarks.

All the 123 patients in DURBIN's series were treated with plaster jacket and he found that the prospect of relief or cure by simple plaster immobilisation became less as the duration of symptoms increased. The more complete the neurologic signs the less was the prospect of relief by simple plaster immobilisation.

Of the 500 cases in HENDERSON's series, complete primary recovery or improvement was achieved in 406 and only in 58 was operation considered. Every patient in his series was treated by only one of the methods referred to below. It might be of interest to present the results he obtained by various conservative methods. These were approximately

Treatment	Number	Ultimate improvement
Rest in bed	123	21 per cent
Plaster jacket	71	46 „ „
Lumbosacral support	104	10 „ „
Manipulation	68	34 „ „
Extension exercises	129	19 „ „

Both GIULIANI and HARDT underlined that all cases in their series had distinct monoradicular neurologic signs.

Of particular interest are those reviews in which the authors give the results of parallel series of conservatively and surgically treated cases, because then it might be assumed that in each material both types of cases were evaluated by corresponding criteria. Such reviews have been presented by KIRSTEIN (1945), YOUNG (1947), SHINNERS & HAMBY (1949), COLONNA & FRIEDENBERG (1949), KEHRER & KRISCHEK (1950), KORHONEN

Table 2. *Conservatively treated series of cases with neurologic signs*

Author	Interval between treatment and review Yrs	Number of cases	Symptom-free		Persistent more or less pronounced symptoms		Treatment	Remarks
			Per cent	Per cent	Per cent	Per cent		
DUNNING 1946	1.25—23 Average: 5	55	36	64	“The methods of treatment were numerous”		“Satisfactory” 54 per cent. “Unsatisfactory” 46 per cent	
DURBIN 1948	2—12	123	35	65	Plaster jacket		Of 65 per cent with persistent symptoms, 28 per cent were improved and 37 per cent unimproved	
HENDERSON 1952	1.5—6	500	23.4	76.6	Bed-rest. Plaster jacket. Lumbosacral support. Spinal manipulation. Extension exercises		Initial effect of treatment: relieved 17.4 per cent, improved 63.8 per cent, no initial improvement 18.8 per cent. Recurrences in 16 per cent	
HARDT 1954	3(?)—10	110	41.9	58.1	Bed-rest, heat, »perspiration cures». Intense physical therapy		Cured + improved 65.5 per cent. Severe pain and occasional recurrences 34.5 per cent	
GIULIANI 1954	3—4	100	30	70	Lordotic manipulation under anesthesia + plaster jacket		Symptom-free immediately after treatment 89 per cent. Cured + improved 93 per cent. Mild persistent symptoms because of osteochondrosis 63 per cent. Recurrences 12 per cent	

& NUMMI (1952) and BERGSMAN & VON REIS & SAHLGREN (1952). All of these authors claim that also the conservatively treated series was diagnosed as cases of sciatica due to disc rupture. Their results, with the exception of those of BERGSMAN and co-workers are accounted for in Table 3.

The diagnosis in KIRSTEIN's material was verified myelographically. In 21 of the 25 operated cases the compression was due to disc ruptures. In the remaining four cases no such evidence was demonstrable but the compression was ascribed to hypertrophy of the ligamentum flavum.

YOUNG's series shows a marked difference between the results obtained by conservative and surgical treatment, and he stated that "only operation offers the patient a definite prospect of cure".

SHINNERS & HAMBY, too, found results less favourable in conservatively treated series.

COLONNA & FRIEDENBERG, like KIRSTEIN, had the diagnosis verified by myelography, but their series of conservatively (28) and operatively (95) treated cases differed considerably in size. They stressed that the conservatively treated group represented a selection in which operation was regarded as indicated, but for various reasons was not performed. As far as they could judge, the size of the defect in the spinal canal, as seen in the myelogram, showed no relation to the severity or persistence of symptoms, or to the clinical course of the patient. Nor in the clinical examination could they find any definite features suggesting in which conservatively treated cases recovery or recurrences might be expected. They stated that the results in the conservatively treated series compared unfavourably with the results obtained in a carefully selected operative series. "The chronicity of this disease must be fully appreciated; most of these patients had suffered five years or more. There can be little justification for letting the disease run its course."

KORHONEN & NUMMI wrote: "It seems that at least slight pain persists in the majority of both the operated and the unoperated cases."

BERGSMAN, VON REIS & SAHLGREN compared 98 conserva-

Table 3. *Conservatively and surgically treated series of cases reported as disc rupture*

Author	Interval between treatment and review		Number of cases	Symptom-free		Persistent more or less pronounced symptoms		Treatment	Remarks
	Yrs			Per cent		Per cent			
KIRSTEIN 1945	0.5—3		24	12.5		87.5		Conservative: not described	Free from radiating pain 37.5 per cent Fit for work 86.4 per cent
	0.5—3		25	24		76		Surgical	Free from radiating pain 72 per cent Fit for work 96 per cent
YOUNG 1947	3—6		248	21		79		Conservative: not described	
	1—4		310	80		20		Surgical	
SHINNERS HAMBY 1949	1—11 Average: 4.3		200	29.5		70.5		Conservative: not described	Fifty per cent had recurrent attacks of back and leg pain
	1—11 Average: 4.3		355	48.5		51.5		Surgical	
COLONNA FRIEDENBERG 1949	1—8 Average: 2.7		28	29		71		Conservative: braces, restricted activity. Physical therapy	Dissatisfied 32 per cent
	1—5		95	60		40		Surgical	Dissatisfied 13 per cent

KEHRER KRISCHEK 1950		72	50	50	Conservative: removal of infected focus, short wave, massage, pyriifer, vitamins of the B complex Surgical	Satisfactory 84.6 per cent Satisfactory 41.2 per cent
		51	17.6	82.4		
KORHO- NEN NUMMI 1952	1-6	31	13	87	Conservative: not described Surgical	Slight attacks of pain not affecting fitness for work 45 Slight attacks of pain not affecting fitness for work 29
	1-6	69	29	71		
MILLIKAN 1954	> 3	100	See remarks	See remarks	Conservative: bed-rest, heat, massage Surgical	Cured + improved 78 per cent. Recurrences 60 per cent. Former occupation 62 per cent Cured + improved 83 per cent. Recurrences 5 per cent. Former occupation 68 per cent
	> 3	329	See remarks	Se remarks		

tively treated and 142 operatively treated cases and found that in regard to the working capacity the results were the same after a sufficiently long period. Surgical treatment had, however, been used only in the more advanced cases.

The results in Table 3 of operated and non-operated cases show that the latter compare less favourably. Only in about 20—35 per cent were the non-operated patients completely symptom-free. The lowest figure (KORHONEN & NUMMI) for the operated cases is 29 per cent, the other authors giving between 40 and 80 per cent. Only KEHRER & KRISCHEK reported definitely more favourable results among those treated conservatively. Comparison of the results on non-operated cases in Table 3 with those in Table 1 will show fairly good agreement (20—25 per cent symptom-free) with the exception of KUHNS' and BRAHME's series, which show higher figures for symptom-free.

Several publications are available on the late results of operated series. It might be of interest also to mention some of these (Table 4). Here, too, the results vary widely, from *e. g.* only 13 per cent (AITKEN & BRADFORD 1947) to 60.7 per cent (O'CONNELL 1950) symptom-free.

In the series referred to above the criteria used often differ from one author to another as does their classification terminology of the late results. And even if the same terminology is used, different investigators may differ in their opinions of the meanings or use of such terms as "excellent", "good", and "fair". In order to secure a uniform basis for evaluation, the series accounted for above were analysed and classed simply as symptom-free and not symptom-free (Tables 1—4). In the column "remarks" information is given for the reader to obtain a more detailed view of the cases.

It is apparent from Tables 1—3 that 12.5—79 per cent of the conservatively treated series were symptom-free. The total number of patients in this series was 3,551, of which 1,388 were symptom-free, which represents 39 per cent of the total.

Table 4. Ruptured disc series treated surgically

Author	Interval between treatment and review Yrs	Number of cases	Symptom-free or cured	Persistent more or less pronounced symptoms	Full working capacity		Remarks
			Per cent	Per cent	Per cent	Per cent	
SENNING SÖÖQVIST 1947	1-3	403	55.7 (completely symptom-free)	44.3			Completely symptom-free + improved 92.7 per cent. Surgical exploration negative in 53 cases 35 re-operations (5 per cent). Back trouble 34.3 per cent
LOVE 1947	5-7	987	53.7 (cured)	46.3			Cured + improved 90.4 per cent. Back trouble 61.5 per cent
AITKEN BRADFORD 1947	2-6	170	13 (completely symptom-free)	85		30	All were insured patients receiving compensation. "No discs" 67 cases. Five deaths. Secondary operation 24 per cent. Total working incapacity 42 per cent
WARIS 1948	2-5	347	41 (completely cured)	59		54	Completely cured + improved 91 per cent The incidence of low back pain was higher than before the operation. Back trouble 66 per cent
LINDGREN 1949	1.5-6	375	58 (free from radiat. pain)	42			Patients' opinions: very beneficial 81 per cent. Secondary operation 7 per cent. Back trouble 47 per cent
O'CONNELL 1950	1-12	443	60.7 (cured)	39.3		92.8	Cured + much improved 92.3 per cent. Completely free from crural pain 77.6 per cent. Recurrences 2.25 per cent (10 cases). Less than 1 year's observation 44 cases. Back trouble 40 per cent
GRANTHAM SPURLING 1953	2-6	298	60.4 (cured)	39.6		82.5	Cured + improved 82.5 per cent

In the surgical series (Tables 3—4) 13—80 per cent were symptom-free. The total number of patients in this series was 3,928, of which 2,097 were symptom-free, which represents 53 per cent of the total.

IV. THE MATERIAL

The present material consisted of 310 patients with conservatively treated sciatica and admitted during the years 1930—1945 to the medical and orthopedic departments of Lund and Malmö. The patient's disease was conceived as idiopathic sciatica in the sense defined on page 5, and the patients were treated at the departments under the diagnoses of *ischias*, *lumbago-ischias*, *syndroma lumbo-ischias*, *neuralgia ischiadica*, *neuritis ischiadica*, *scoliosis ischiadica*, *prolapsus disci*, *hernia disci intervertebralis*, *suspicio prolapsus disci intervertebralis*. The cases were selected from a large number of admissions with these diagnoses, a necessary condition for acceptance being neurologic signs at the time of hospitalisation.¹

SEX AND AGE. — Of the 310 patients, 205 (66 per cent) were males. Males are predominant in most statistics. BRAHME (1942), for example, reported 66 per cent males of 696 patients, LOVE (1947) 70 per cent of 1,217 patients, and ÖSTBERG (1950) 70 per cent of 505 patients. The youngest patient at hospitalisation was 15 and the oldest 67 years old, both males. The sex and age distributions at the time of hospitalisation are given in Diagram 1. It is apparent from the diagram and from Table 5, where the patients are grouped in 10-year age classes, that the frequency of the disease was especially high in the 30 < 50 year class, which comprised 70 per cent of the cases. LOVE (1947) and WARIS (1948) gave almost the same frequency of the disease for this age class.

¹ If a patient had been admitted more than once and neurologic signs were demonstrable on more than one occasion, the last admission is to be understood as *hospitalisation* or *time of hospitalisation*.

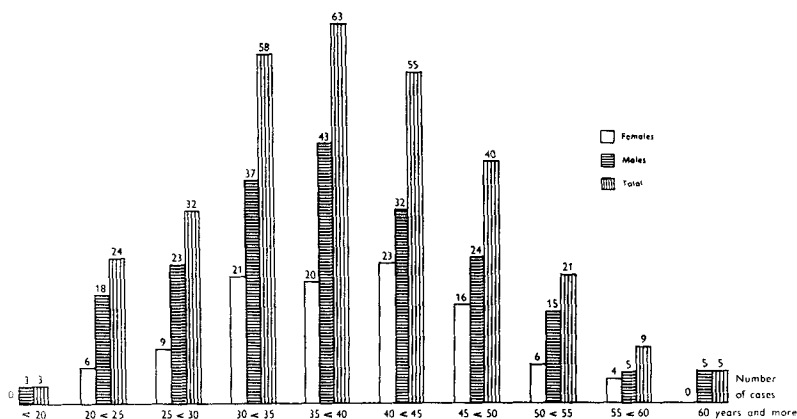


Diagram 1. Age and sex distribution at hospitalisation

Table 5. Frequency in 10-year age classes

Age class	Males Per cent of 205	Females Per cent of 105	Total Per cent of 310
<20	1.5	—	1.0
20<30	20.0	14.3	18.1
30<40	39.0	39.0	39.0
40<50	27.3	37.1	30.6
50<60	9.8	9.5	9.7
60 and over	2.4	—	1.6

OCCUPATIONS. — The patients are classed according to occupation in Table 6. Forty-four per cent of them were heavy workers.¹ The areas covered by the four departments lie in an agricultural province (Scania) and more than half of the heavy workers were farm labourers. As to the females, most fell within the group "light manual workers", to which wives doing their own housework were also assigned. They represented 81 per cent of this group. As housework includes both light and heavy work, it was not possible to classify the women accord-

¹ The Employment Exchange, Malmö, decided what work should be classed as heavy, light or not manual.

ing to the heaviness of their work with such exactitude as the males, and there is reason to suppose that some of the women in this group should have been assigned to the group "heavy manual workers".

Table 6. Classification according to heaviness of occupation

	Males	Females	Total
Heavy manual workers (farm workers, unskilled workers, female land workers, and others)	123	13	136
Light manual workers (artisans, chauffeurs, women doing house-work, nurses, and others)	53	85	138
Not manual workers (engineers, teachers, clergymen, clerks, and others).....	29	7	36

ANAMNESTIC DATA

Earlier symptoms

One third (71 males and 35 females) had earlier been completely symptom-free. The remainder had had back and/or sciatic symptoms earlier. Those who had earlier had sciatica (115) had usually had associated back trouble (lumbago-ischias). The frequencies of these earlier symptoms are given in Table 7.

Table 7. Earlier symptoms in 204 patients before hospitalisation

	Lumbago	Lumbago and/or Insuff. dorsi	Ischias or Lumbago-ischias	Ischias or Lumbago-ischias + Lumbago and/or Insuff. dorsi
Males	51	5	51	27
Females	23	10	25	12
Total	74	15	76	39

Trauma

Trauma preceding lumbago-ischias at the time of hospitalisation and described either as a single or repeated trauma had been reported in altogether 21 per cent. For comparison it might be mentioned that LOVE & WALSH (1940) reported a frequency of some sort of trauma in 58 per cent of 500 cases and WARIS (1948) in 22 per cent of 374.

Table 8. Trauma preceding symptoms at hospitalisation

	Males	Females	Total
<i>Single trauma:</i>			
Severe torsion and stretching. Jump or fall from height. Lifting something heavy	27	5	32
<i>Repeated trauma:</i>			
Heavy or unaccustomed work such as harvesting beets, shoveling snow, sport, felling trees, laundry work. Lifting, carrying	16	17	33
	43	22	65

The nature of the trauma accounted for in Table 8 shows that males had reported a single trauma more frequently than repeated trauma and that repeated trauma had been reported much more often by the females. Of the 32 patients who had sustained a single trauma, the symptoms appeared immediately after the injury in 81 per cent.

Symptoms at the time of hospitalisation

Some kind of *back trouble* had preceded the radiating symptoms in the leg at the time of hospitalisation in 199 cases, thus sciatica without preceding back symptoms had occurred in 111 cases.

As to the spread of the *radiating symptoms* in the lower leg and foot, it was described as localised to the anterior surface of the lower leg in 5 cases, to the lateral and/or posterior surface down to the heel and out along the lateral border of the

foot in 210 cases (68 per cent), to the lateral and/or posterior side of the lower leg over the anterior surface of the ankle to the medial border of the foot and out into the big toe in 14 cases. The remaining (81) described varying localisations of the radiation of the pain in the lower leg and foot.

Data about pain on sneezing or coughing, paresthesia or numbness and weakness had been noted, especially after 1940, but there is reason to believe that the patients had not been questioned systematically as to these symptoms before that time, because their significance had not been fully realised then. An account of the frequencies of these symptoms was therefore not considered justified.

OBJECTIVE FINDINGS

The back

Deformities or malpositions of the spine that were obviously related to the pain at the time of hospitalisation — “sciatic scoliosis”, aplanation of the lumbar spine — and decreased flexibility of the spine, palpable muscle contractures or tenderness to palpation were findings that had evidently been recorded with a widely varying degree of accuracy. Generally speaking, the state of the back had been described more carefully at the orthopedic departments than at the medical, where more attention had been directed to the neurologic signs. Owing to this frequent absence of adequate data, no account is given of the state of the back at the time of hospitalisation.

Neurologic signs

LASÈGUE’S SIGN. — All patients except one had been examined for Lasègue’s sign. In 104 cases it was found to be positive bilaterally and in 181 cases only on the affected side. In 24 cases Lasègue’s sign was found to be negative.

PARESIS, SENSIBILITY AND REFLEX DISTURBANCES. — These neurologic disturbances are accounted for in Table 9.

In 25 patients paresis had been noted, which represents only

Table 9. Neurologic signs at hospitalisation in 310 patients

Paresis	Sensibility disturbance in dermatome					Reflex disturbances			Total number of neurologic signs
	L4	L5	S1	L5 + S1	Un-certain	Knee jerk weak or absent	Ankle jerk weak	Ankle jerk absent	
25	1	7	73	4	46	49	89	168	462

8 per cent of the entire material. This figure is remarkably low as compared with that found in reports on operated series of ruptured discs. BRADFORD & SPURLING (1947), for example, found paresis in about half of their series.

The low frequency of paresis registered in the present material might be explained. Slight paresis, which the patients have not noticed themselves, can readily escape detection, unless it receive special attention by the examiner. Thus, for example, examination for a slight paresis of the big toe was neglected until its importance as a preoperative diagnostic guide in disc surgery had been realised. It is therefore not surprising that most of the patients (220) in the present material had not been examined for such a paresis.

Information about sensibility tests were missing in the record sheets in 22 cases. The distribution of sensibility disturbances in dermatomes is given in Table 9.

Table 10. Distribution of neurologic signs at hospitalisation in 310 patients

	Number of cases	Per cent of 310
Paresis only	4	1.3
Sensibility disturbances only	38	12.3
Reflex disturbances only	172	55.5
Paresis + sensibility disturbances	4	1.3
Paresis + reflex disturbances	3	1.0
Sensibility disturbances + reflex disturbances	75	24.2
Paresis + sensibility disturbances + reflex disturbances	14	4.5

In contrast to what was stated above about paresis, disturbances of the ankle jerk have long been recognised as a pathognomonic sign and therefore of importance to test. In only 4 cases the record sheets contained no notes about the ankle jerk.

The knee jerk was tested in all cases except 7.

The frequencies of the neurologic signs, isolated and in various combinations, are given in Table 10.

Cerebrospinal fluid findings

In 102 cases the cerebrospinal fluid had been analysed at hospitalisation. Only in 7 had quantitative determinations been made of the total proteins according to Izikowitz. Only one case showed increased total protein. The qualitative tests, according to Pandy and Nonne, were positive in at least one third of the cases studied. The semi-quantitative test, according to Bisgaard, showed slightly increased values in 10 of 49 patients examined. In most of the cases the level at which the picture had been made was not noted.

No conclusions as to the nature or site of a spinal lesion could be made on the basis of these examinations.

Roentgen examination

In 276 cases the spine had been examined roentgenographically, usually the lumbar section only. The abnormalities noted by the roentgenologists were mainly of the type aplanated lumbar lordosis, scoliosis, congenital anomalies, but also formation of osteophytes described as "spondylosis deformans" of varying degree.

Of the roentgenograms taken at hospitalisation, those of 193 patients were checked, a special search being made for signs of disc degeneration. Comparative roentgenologic studies were possible in 61 patients, who had been roentgenologically examined both at hospitalisation and at the re-examination. The results of these roentgenographic studies are reported elsewhere (SÖDERBERG & ANDRÉN 1955).

Myelographic examination

Myelograms had been taken at hospitalisation in 39 cases. The results are given in Table 11. As to the normal myelograms, it should

he stressed that none of the contrast media used at that time (1935—1945) can reveal disc protrusion with any degree of certainty. Especially oxygen myelograms are difficult to interpret, and evidently only fairly large medial protrusions can produce an impression in the subarachnoid space. Therefore, normal myelograms in this series do not exclude the possibility of disc protrusions.

Table 11. Myelograms of 39 patients taken with oxygen or lipiodol at hospitalisation

Contrast medium	No.	Abnormal	Uncertain	Normal
Oxygen	27	8	7	12
Lipiodol	12	3	2	7
Total	39	11	9	19

Treatment

The fundamental treatment consisted of bed-rest for a varying period plus medicinal and/or physical and/or orthopedic measures in various combinations. The therapeutic measures listed below represent a selection of those most frequently mentioned in the record sheets:

electric heater ("baker"), diathermy, short wave irradiation;
 baths (furuncul-, salt-, Roman, pine needle-), Scotch showers;
 massage, active and passive movements, gymnastics;
 injections of isotonic saline;
 pyrififer, neostigmine, neuroyatrén, vitamin B;
 traction, plaster splints, plaster bed and plaster jacket.

It was not thought necessary to account for the frequency and extent of the various types of treatment in relation to the course of the disease while the patient was in hospital or afterwards, because it was not my intention to try to demonstrate the superiority of any particular conservative method or in comparison with surgical treatment. However, in order to form a conception of the patient's opinion of the effect of treatment, all of the patients were asked: "Do you think treatment gave you much relief or no relief?" The answers were: good relief in 178 cases and no relief in 65, while the remaining 67 replied

that they could not say with certainty whether or not treatment had been beneficial.

It should also be mentioned that owing to lack of improvement or for some other reason 26 patients went to chiropractors. Of these, 13 reported good relief, 9 fairly good relief, and the remaining 4 claimed that the treatment had not been beneficial.

Hospital days

The periods the patients spent at the various departments are given in Table 12. In some cases in which the patients spent some time in another hospital immediately before they entered any of the four departments the hospital days were added to those spent in Lund or Malmö. It is apparent from the table that for 264 cases (85 per cent) stay in hospital was less than 2 months.

The total number of hospital days for the 310 patients was 12,684, which implies an average of 41 days per patient.

For comparison it might be mentioned that in series treated in a similar way and reported by BOYSEN (1947) and YTREHUS (1947) the average number of hospital days was 41 and 37.2 (431 and 220 cases, respectively).

Table 12. Duration of hospital care in relation to age at hospitalisation

Hospital care	< 30 years	30 < 40 years	40 < 50 years	50 years and more	Total		Total
					Males	Females	Per cent
<1 month	25	41	36	19	81	40	39.0
1<2 months	26	62	41	14	97	46	46.1
2<4 months	5	17	16	—	22	16	12.3
4<6 months	2	—	2	2	4	2	1.9
6 months and more	1	1	—	—	1	1	0.6

In reports of surgical series no information could be found about the duration of the time the patients spent in hospital. Therefore, for comparison, analysis was made of the duration of hospitalisation of 214 patients operated on during the years 1952—1955 at the Orthopedic Department in Malmö and the mean duration was found to be 25 days. In 15 cases (7 per cent) hospitalisation was at least 2 months, while the corresponding figure for the 310 patients (Table 12) was 46 (15 per cent).

V. THE RE-EXAMINATION

The clinical review was carried out during 1953—1954. Of the 310 patients, all except 4 were reviewed by the writer personally.

It was found that 10 patients had undergone operation after 1945 (the present material covers the years 1930—1945) because of a recurrence of sciatica. In one of the cases the recurrence was on the "healthy" side.

The interval between the hospitalisation and the review varied between 8 and 23 years (average 14.5 years) and was at least 12 years for 194 patients and 18 years for 96. It might be of interest to account for the number of patients after these last-mentioned periods in relation to the number in each age class at the time of hospitalisation. It is apparent from Table 13 that the distribution was equal in this respect.

At the review all details were noted of the course of the disease after hospitalisation that were considered of importance for the definitive evaluation of the disease and any sequelae.

Table 13. Number of patients 12 years and 18 years after hospitalisation in relation to the numbers in various age classes

At hospitalisation		12 yrs afterwards		18 yrs afterwards	
No. of patients	Age class	No. of patients	Per cent	No. of patients	Per cent
3	<20	2	66.7	1	33.3
56	20<30	37	66.1	21	37.5
121	30<40	76	62.8	30	24.8
95	40<50	56	58.9	31	32.6
30	50<60	20	66.7	11	36.7
5	60 and over	3	60.0	2	40.0
310		194	62.6	96	31.0

Thus, special notes were made of the condition of the patients on discharge from hospital, the type and duration of any persistent back or leg trouble and after what period the patients recovered partial or complete working capacity. The same inquiries were made about the entire course of the disease up to the time of the review and about any anamnestic data before hospitalisation. The patients' reports were checked with any notes made in the record sheets at the time of hospitalisation. If the patients had at any time been treated at some other hospital because of their disease, all data available from the records were collected and information available was analysed and used as a control. Special attention was also directed to what extent a patient's working capacity had been impaired by his disease. These data were recorded on a continuous diagram

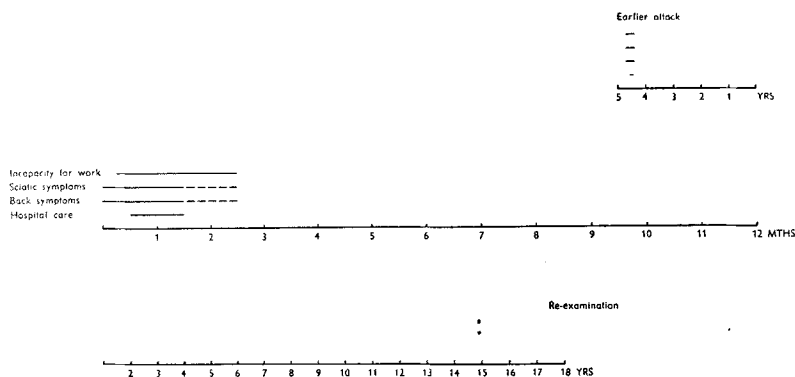


Diagram 2. G. A. No. 259. Male. In 1931 after some months' back symptoms, acute onset of radiating symptoms in right leg when lifting. One month in Ystad Hospital because of ischias dx. After 3 months' rest at home complete recovery and full working capacity. Then felt well until 2 weeks ago when similar symptoms in right leg. Continued to work for 1 week but then stopped because of increasing pain. — Medical department, Lund, from 25 October to 23 November, 1935. — Almost complete recovery on discharge. One month after return home full capacity for heavy farm work. No recurrence since, but occasionally slight back symptoms after heavy work. In 1950 slight symptoms in right leg after working in cold and draught. Recovered after few days' bed-rest. Since then always felt well.

(exemplified in Diagram 2), which helped to form a reliable and clear picture of the entire course of the disease from some different points of view.

The results of the above-mentioned analyses are accounted for in the next section.

At the review the patients were examined mainly for

- 1) state of the back, and
- 2) neurologic signs.

The back

Classification of the back as normal will depend in some degree on the personal opinion of the examiner. As far as scoliosis is concerned, opinions may agree fairly well, but slightly increased or aplanated thoracic kyphosis and lumbar lordosis will probably be described differently by different examiners. As to the flexibility of the lumbar spine, the age factor must also be taken into account, flexibility decreasing with increasing age, and here, too, opinions must often differ as to what should be regarded as normal.

At the re-examination the patients were classified according to the state of the back into three groups. This was done with the intention of determining any correlation between the state of the back and persistent symptoms (accounted for in the next section). As all of the patients except 4 were examined by one and the same examiner, the grounds on which the patients were classified must be regarded as uniform. The three groups were:

I) Normal back	105 cases
II) Slightly changed back	122 „
III) Pronouncedly changed back	82 „

Here normal back is to be understood as the writer's personal opinion of what was a normal back, *i. e.*, no demonstrable spinal deformities in the frontal or sagittal plane and no divergence from normal flexibility of the lumbar spine.

To group II were assigned patients who in one or both of these respects showed uncertain or certain but slight divergence from what was considered normal (Group I).

Group III consisted of patients with advanced spinal changes such as pronounced scoliosis, aplanated lumbar lordosis, muscle contractures in the lumbar region and limited flexibility.

Neurologic examination

Neurologic examination included testing for Lasègue's sign and a search for any paresis, atrophy, sensibility disturbances and examination of the knee and ankle jerks.

Examination technique

PARESIS. — The patient was in the supine position. The gross functional strength of the dorsal extension of the big toe, of the dig. II—V and of the pronation of the foot were tested simultaneously and compared. The gross functional strength of the plantar flexion of the ankle and toes was not regularly examined.

SENSIBILITY. — The sensibility of the lower leg and foot was tested by gentle stroking of both legs of the patient simultaneously and asking him whether he noticed any difference in the feeling on either side. Only the approximate outline of any sensory loss was determined. Sense of pain and sense of temperature were not tested.

ATROPHY. — All patients with pareses were examined for atrophy by measuring the maximal circumference of the calf and of the thigh (15 cm. above the patella) on either side.

REFLEXES. — The knee jerk was tested with the patient sitting in a chair with the anterior part of the sole supported on the floor. The ankle jerk was tested with the patient kneeling in a chair with the feet hanging over the edge of the seat. The strength of the percussion was varied in order to record even small variations in the threshold of stimulation of the reflexes.

Table 14. Neurologic signs at re-examination in 310 patients

Paresis	Sensibility disturbance in dermatome					Reflex disturbances			Total number of neurologic signs
	L4	L5	S1	L5 + S1	Uncertain	Knee jerk weak or absent	Ankle jerk weak	Ankle jerk absent	
39	1	14	63	10	4	13	73	165	382

Table 15. Distribution of neurologic signs at re-examination in 310 patients

	No. of cases	Per cent
Paresis only	2	0.6
Sensibility disturbances only	12	3.9
Reflex disturbances only	160	51.6
Paresis + sensibility disturbances	6	1.9
Paresis + reflex disturbances	10	3.2
Sensibility disturbances + reflex disturbances	53	17.1
Paresis + sensibility disturbances + reflex disturbances	21	6.8
No neurologic signs	46	14.8

Table 14 shows the number of the different neurologic signs registered, and Table 15 shows to what extent these disturbances were solitary or in combination with one another. The set-out of these tables is the same as that of Tables 9 and 10, which give the neurologic signs at hospitalisation. On comparison of the tables it is seen that the total number of neurologic signs was larger (80) at hospitalisation than at the re-examination. The actual number of neurologic signs demonstrable at hospitalisation but not at the re-examination was, however, still larger, as is apparent from Table 16, which compares neurologic signs demonstrated on both occasions. The number of neurologic signs that persisted in the same frequency but often varied in intensity is given in the first column. The number of neurologic signs registered at hospitalisation but not demonstrable at the re-examination ("disappeared") was 170. The "new" neurologic signs (90) can be due to a recurrence in the meantime, or they might be only apparent, *i. e.*, they might have been missed at the time of hospitalisation and not demonstrated until the re-examination, at which the search for neurologic signs was probably more thorough. But the "disappeared" neurologic signs might also be only apparent, because the possibilities of over-diagnosis at the examination at hospitalisation must also be taken into account.

LASÈGUE'S SIGN was definitely positive in one case only. This patient had acute symptoms of sciatica at the time of the review.

PARESIS. — As pointed out in the previous section, in the present material the number of patients with demonstrable paresis at hospitalisation appeared low in relation to the number of cases with impaired ankle jerks. This might be due to the examiners' not having paid special attention to the occurrence of isolated paresis of the ankle or toes. This assumption is supported by the fact that such isolated pareses were demonstrated in a larger number (39) at the re-examination than at hospitalisation (25) (Tables 9 and 14). There is also reason to suppose that some of these missed cases were fairly grave pareses, because it seems that slight paresis has a tendency to disappear. This assumption is supported further by the observation that the number of "new" pareses was found in as many as 26 patients (Table 16). Of these 26, however, 11 had recurrences in the meantime, which can reasonably help to explain the increase.

Persistent symptoms in the form of a weak ankle and/or sensation of cold in the foot were reported by 21 patients.

Table 16. Comparison of neurologic signs at hospitalisation and at re-examination

	Persistent	"Dis-appeared"	"New"
Paresis	13	12	26
Sensibility disturbances	56	75	36
Reflex disturbances	223	83	28
	292	170	90

ATROPHY. — In 22 cases measurable atrophy of the musculature of the leg was demonstrated, in most cases in the lower leg only. Fifteen of these patients also had pareses.

SENSIBILITY. — More than half (57 per cent) of the sensibility disturbances registered at hospitalisation could not be demonstrated at the re-examination. At the re-examination “new” sensibility disturbances were found in 36 patients, of whom 12 had, however, had recurrences in the meantime.

The patients themselves, it seems, seldom notice a slight impairment of sensibility in sciatica. When they had, in this material, they reported at the re-examination that the sensibility had usually recovered completely within the first few months after hospitalisation. In those cases in which the patients had observed a marked reduction or complete loss of sensibility, regression was, as a rule, much slower — several years — or sensibility failed to return.

REFLEX DISTURBANCES. — Of the 49 patients with impaired or absent *knee jerks* at hospitalisation persistent impairment or loss was demonstrable in only 10 at the re-examination. Of the 39 patients who showed no reflex disturbances at the re-examination, all except 3 had only had slight or uncertain impairment of the jerk at the time of hospitalisation. Only 3 patients had “new” knee jerk disturbances. The difference between either side was only slight.

The number of patients with impaired or absent knee jerks (49) at the time of hospitalisation may seem high, especially as only 5 reported pain in the area of the L4-dermatome. The possibility of an over-diagnosis of reflex disturbances at hospitalisation must be borne in mind. In this connection it is to be mentioned that with the exception of 2 cases all 49 had not

Table 17. Ankle jerk at hospitalisation and at re-examination

At hospitalisation		At re-examination			
Ankle jerk		Absent	Weak	Normal	Complete recovery Per cent
Absent	168	121	27	20	11.9
Impaired	89	36	29	24	27.0

only impaired knee jerk, but also other neurologic signs at the time of hospitalisation. The records of the 2 patients with isolated knee jerk impairment contained notes of pain in the L4-dermatome.

As to the altered *ankle jerks* in 257 patients at hospitalisation, it was thought of interest to compare them with the findings made at the re-examination. It is apparent from Table 17 that complete recovery of the ankle jerk after earlier absence was less common than if the jerk had only been impaired. Recurrences had occurred in the same proportion among those with absent and with impaired ankle jerk.

VI. THE REVIEW

The further course or sequelae after sciatica has been accounted for in different ways. Many authors compare the state of the patient during the acute stage with that at the review. In the classification of their cases they often employ such terms as "excellent" to denote complete freedom from symptoms and "improved" to designate a generally undefined improvement. As to such a painful condition as lumbago-ischias, which in the acute stage often incapacitates the patient, the term "improved" might, however, imply that the patient still has fairly considerable persistent symptoms. It would therefore appear more correct to describe the severity and nature of the trouble in those who are not symptom-free.

I. THE SEVERITY AND NATURE OF TROUBLE AFTER HOSPITALISATION

TERMINOLOGY. — The terminology used below to describe the severity and duration of the trouble during the later course is modelled mainly on ÖSTBERG's (1950) terminology.

The following terms were employed:

- I. COMPLETELY SYMPTOM-FREE**
- II. OCCASIONAL MILD TROUBLE**
- III. RATHER CONSTANT MILD TROUBLE**
- IV. RECURRENCE**
- V. RATHER CONSTANT SEVERE TROUBLE**

I. COMPLETELY SYMPTOM-FREE. — This is to be understood as complete freedom from sciatica and back symptoms. The presence of any mild paresthesia or paresis giving the patient no trouble was not taken into account.

II. OCCASIONAL MILD TROUBLE. — This is to be understood as such back trouble as slight dull pain and/or weak lower back (*insufficiencia dorsi*) often occurring only during or after heavy work or work in an uncomfortable position or on exposure to cold, for example. Proper attacks of lumbago were also classified under this heading, but only if the attack was short and rendered the patient unfit for work for at most two weeks. It is mainly patients with back symptoms that were included in this group. Patients with leg symptoms were assigned to this group provided the trouble had only the character of occasional dull pain or feeling of stiffness.

III. RATHER CONSTANT MILD TROUBLE. — The symptoms are of the same type as in the preceding group but they differ in duration. The trouble was sometimes constant for many years but more often the patient had symptom-free intervals of varying duration alternating with periods of trouble.

IV. RECURRENCE. — This is to be understood as a proper recurrence of sciatica. Since it was considered of special importance to account for the frequency of recurrences, all patients who had had a recurrence were allotted to this group independently of any trouble that might otherwise have assigned them to group II or III. Assignment to this group required the fulfilment of certain conditions. The recurrence must have lasted for at least two weeks and the patient must have been unfit for work for a similar period. As a rule, however, the recurrences lasted longer and the patient had been disabled for a longer period. Periods of severe back pain lasting for at least three weeks with a corresponding period of disability were also classed as recurrences.

V. RATHER CONSTANT SEVERE TROUBLE. — This group included the same symptoms as group III, but of greater severity. As in group III the back symptoms dominated but concomitant sciatic symptoms were relatively more common. The sciatic symptoms occurred mainly in association with pronounced back symptoms. The back symptoms can be regarded

as a more severe type of *insufficiëntia dorsi*, e. g., more or less permanent dull pain in the lower back — chronic lumbago. Periodic deterioration in association with increased leg symptoms sometimes resulted in hospital care or bed-rest and a varying period of disability. It should be observed that these types of deterioration did not always assign the patients to group IV (recurrences) because they did not appreciably worsen the patients' ordinary condition from which they were therefore sometimes difficult to distinguish.

The terminology defined above was applied in the description of the *frequency of trouble* during various intervals after the time of hospitalisation.

As mentioned, of 310 patients examined, after 1945 (the material consists of patients cared for in 1930—1945) 10 were operated on because of recurrence of sciatica under the diagnosis of disc protrusion. These 10 cases will be dealt with separately. The remaining 300 cases (199 males and 101 females) represent the material proper of the investigation. Since the shortest interval between hospitalisation and the review was 8 years, the material was accounted for in 4-year periods.

The analysis¹ gives data on the situation of all patients during an initial period of up to 4 years and a second period from then up to 8 years after hospitalisation. Of the 300 cases, the interval between hospitalisation and the review was at least 12 years in 191 and 18 years in 96. The frequency of trouble for those with such long intervals is also briefly accounted for.

In this conjunction it should be pointed out that in this part of the analysis *an individual case can be transferred from one symptom group to another from one period to another*. In other words, freedom from symptoms or trouble of various types do not regularly accompany the same patients, although this was the rule rather than the exception.

It sometimes happened that a patient in one 4-year period

¹ After consultation with Professor Carl-Erik Quensel, Lund, the statistical analysis of the data was carried out by fil. kand. Ernst Björse.

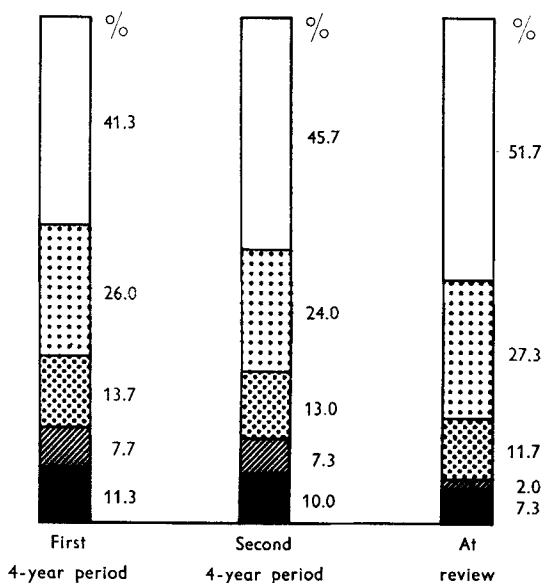
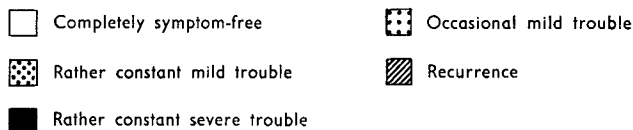


Diagram 3. Severity of trouble in 300 patients during first and second 4-year periods after hospitalisation and at time of review.



had alternating trouble of types II, III and V. For assignment to a given group it was necessary for the trouble characteristic of that group to dominate the picture for at least 2 years of the 4-year period. It was, nevertheless, sometimes doubtful to which group a patient should be allotted. In such cases he was usually assigned to the more severe group.

As to group I (completely symptom-free) acceptance in that group required freedom from symptoms throughout each of the 4-year periods and concerning cases in which the interval between hospitalisation and the review was 18 years, also during the 6-year period between 12 and 18 years. In the evaluation of the situation at the time of the review the requirement

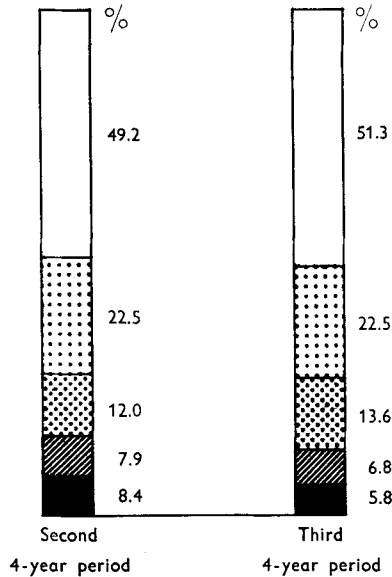
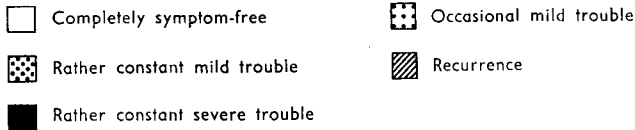


Diagram 4. Severity of trouble in 191 patients during second and third 4-year periods after hospitalisation.

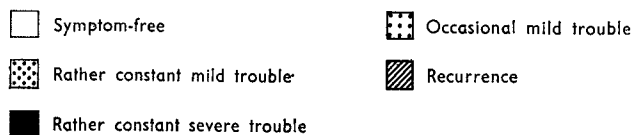


was modified, in that a case was accepted in group I if the patient had been symptom-free for at least 2 years.

Diagram 3 shows the frequency of trouble for the entire material during the first and second 4-year periods after hospitalisation and at the time of the review. Diagrams 4 and 5 account for 191 and 96 patients for whom the interval between hospitalisation and the review was at least 12 and 18 years, respectively. It is apparent that no essential changes were noted in the frequency of trouble on comparison between the first and second 4-year periods, the second and third 4-year periods and between the 8—12 and 12—18 year periods. However, Diagram 3 shows that from the first 4-year period to the time of the



Diagram 5. Severity of trouble in 96 patients during third 4-year period and during 12-18 years after hospitalisation.



review an increase occurred in the number of completely symptom-free. Numerically no significant difference was found between the males and the females in any respect (Diagram 6). Comparison in analogy with Diagrams 3-5 regarding the frequency of trouble among males and females showed no certain difference either.

The frequency of recurrences in the various periods was fairly constant and neither here were any significant differences found between the males and the females (Table 18).

To what extent the cases in the various groups persisted in the same group during the following period, in other words how many of the patients were symptom-free or had trouble during the periods under consideration is apparent from Table

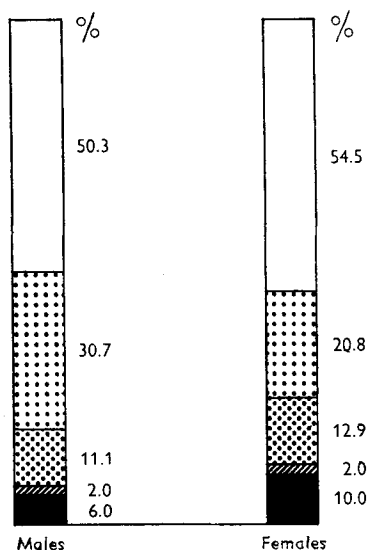


Diagram 6. Severity of trouble in 199 males and 101 females at time of review.

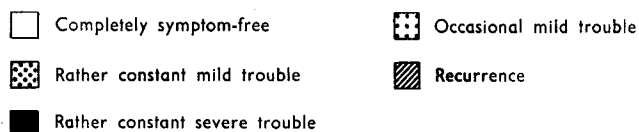


Table 18. Frequency of recurrences in per cent during different periods after hospitalisation

No. of patients	First 4-year period		Second 4-year period		Third 4-year period		12—18 years	
	M	F	M	F	M	F	M	F
300	7.5	7.9	7.5	6.9	—	—	—	—
191	6.3	7.7	8.7	6.2	7.9	4.6	—	—
96	8.5	10.8	5.1	8.1	5.1	5.4	5.1	5.4

19. Of those 124 patients completely symptom-free during the first 4-year period 81 per cent were still symptom-free at the time of the review, which implies that 34 per cent of the entire

Table 19. Patients still in their original groups during different periods¹

C o n d i t i o n	First 4-year period	Second 4-year period		At review	
	No.	No.	Per cent	No.	Per cent
Completely symptom-free	124	111	89.5	101	81.5
Occasional mild trouble ..	78	60	76.9	47	60.3
Rather constant mild trouble	41	26	63.4	13	31.7
Rather constant severe trouble	34	26	76.5	13	38.2
Total	277	223	80.5	174	62.8

¹ Group IV not included.

material were completely symptom-free as from hospitalisation. The corresponding figure for the persistence of occasional mild trouble was 16 per cent. Of those who had rather constant mild or rather constant severe trouble during the first 4-year period, about one third had such persistent trouble until the review.

Of the 78 patients with occasional mild trouble during the first 4-year period, 26 per cent were symptom-free at the review, 65 per cent had occasional mild trouble, while the remainder (9 per cent) had still more trouble than before.

Of the 41 patients with rather constant mild trouble, 8 were symptom-free, 12 had occasional mild trouble, while in the rest (51 per cent) the trouble was the same or worse than before.

Of the 34 patients with rather constant severe trouble, 7 were symptom-free, 5 had only occasional mild trouble. In the remainder (65 per cent) the trouble was about the same as before, though in some it was less severe (Group III).

The analysis given above deals with the duration and severity of the patient's trouble but not of the nature of trouble, *i. e.*, the symptoms. Since such an analysis is also necessary, the nature of the symptoms dominant during different periods will be

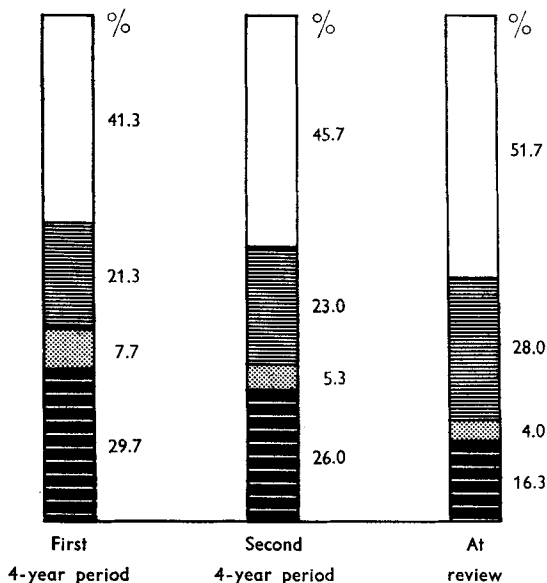


Diagram 7. Symptoms in 300 patients during first and second 4-year periods after hospitalisation and at time of review.



accounted for. These different symptoms are described as “only back symptoms”, “only sciatic symptoms” and “both sciatic and back symptoms”.

As is apparent from Diagram 7, the frequency of radiating symptoms decreased after a long interval (first 4-year period — time of review). No difference was found for only back symptoms. As will be pointed out later in the evaluation of persistent or new back trouble after lumbago-ischias the possibility of such trouble being due to factors other than the earlier lumbago-ischias must be borne in mind.

To what extent the various symptoms were intermittent (Group II) or continuous (Groups III and V) is apparent from Table 20. The frequencies of patients with intermittent and con-

Table 20. Intermittent and continuous symptoms after hospitalisation¹

Completely symptom-free	Intermittent Only (II)			Continuous (III + V)		
	Both sciatic and back symptoms	Only sciatic symptoms	Only back symptoms	Both sciatic and back symptoms	Only sciatic symptoms	Only back symptoms
First 4-year period (300 cases) 124 41.3 %	27 9.0 %	15 5.0 %	36 12.0 %	43 14.3 %	5 1.7 %	27 9.0 %
	78 cases = 26.0 %			75 cases = 25.0 %		
Second 4-year period (300 cases) 137 45.7 %	27 9.0 %	10 3.3 %	35 11.7 %	32 10.7 %	4 1.3 %	33 11.0 %
	72 cases = 24.0 %			69 cases = 23.0 %		
Third 4-year period (191 cases) 98 51.3 %	17 8.9 %	4 2.1 %	22 11.5 %	12 6.3 %	2 1.0 %	23 12.0 %
	43 cases = 22.5 %			37 cases = 19.4 %		
12-18 years (96 cases) 57 59.4 %	9 9.4 %	2 2.1 %	7 7.3 %	6 6.3 %	2 2.1 %	8 8.3 %
	18 cases = 18.8 %			16 cases = 16.7 %		
At review (300 cases) 155 51.7 %	25 8.3 %	7 2.3 %	50 16.7 %	20 6.7 %	4 1.3 %	33 11.0 %
	82 cases = 27.3 %			57 cases = 19.0 %		

¹ Group IV not included.

Table 21. Intermittent symptoms in relation to heavy work or exposure to cold¹

		Independently of work or cold	Dependent on work or cold etc.
First 4-year period 78 cases = 26.0 % of entire material	Only back symptoms	23 29.5 %	13 16.7 %
	Only sciatic symptoms	10 12.8 %	5 6.4 %
	Both sciatic and back symptoms	20 25.6 %	7 9.0 %
	Percentage of entire material	17.7 %	8.3 %
Second 4-year pe- riod 72 cases = 24.0 % of entire mate- rial	Only back symptoms	21 29.2 %	14 19.4 %
	Only sciatic symptoms	7 9.7 %	3 4.2 %
	Both sciatic and back symptoms	18 25.0 %	9 12.5 %
	Percentage of entire material	15.3 %	8.7 %
At review 82 cases = 27.3 % of entire material	Only back symptoms	25 30.5 %	25 30.5 %
	Only sciatic symptoms	4 4.9 %	3 3.7 %
	Both sciatic and back symptoms	16 19.5 %	9 11.0 %
	Percentage of entire material	15.0 %	12.3 %

¹ Group IV not included.

tinuous symptoms were roughly equal. Of those who at the review had intermittent symptoms almost half had such symptoms only in association with heavy work, exposure to cold or the like (Table 21). In Tables 20—21 the recurrences (Group IV) are not included.

Below the material is divided in different ways in order to determine any difference in prognosis between different categories of patients.

The comparisons made were:

1. between heavy manual workers and others (light/not manual workers);
2. between patients with "normal", "slightly changed" and "pronouncedly changed" back at the time of the review;

3. between patients who had the initial attack of sciatica in different age classes;
4. between patients who were completely symptom-free before the time of hospitalisation and the remainder.
5. One hundred and eighty-nine patients without earlier sciatic trouble were compared with respect to age at initial onset (time of hospitalisation).
6. One hundred and four earlier completely symptom-free patients were compared with regard to the duration of the disease at the time of hospitalisation.

1. COMPARISON BETWEEN HEAVY MANUAL WORKERS AND OTHERS (LIGHT/NOT MANUAL WORKERS). — The entire material (300) was divided into two categories, those doing heavy manual labour at the time before hospitalisation being assigned to one group (134) and the remainder (166) to the other. The latter group consisted of 132 light manual workers and 34 not manual workers. The occupations representative of the various categories were accounted for earlier (page 38). With but few exceptions all of the patients returned to their usual work after hospitalisation and were still in the same occupation at the time of the review. Fourteen of the heavy workers thus took up a somewhat lighter occupation after hospitalisation, but since they were distributed in equal proportion among the various trouble and symptom groups, they did not influence the percentages given.

On comparison with the two categories in Diagram 8, it will be apparent that no significant differences were found between the frequency of trouble during the first and second 4-year periods and the time of the review. As to the period when the increased frequency of freedom from symptoms occurred, a difference was found. Among the heavy manual workers the frequency of freedom from symptoms increased from the second 4-year period to the review and among the light and not manual workers from the first 4-year period to the review. As to the various symptoms (Diagram 9), no certain differences were found between heavy manual workers and the remainder. As

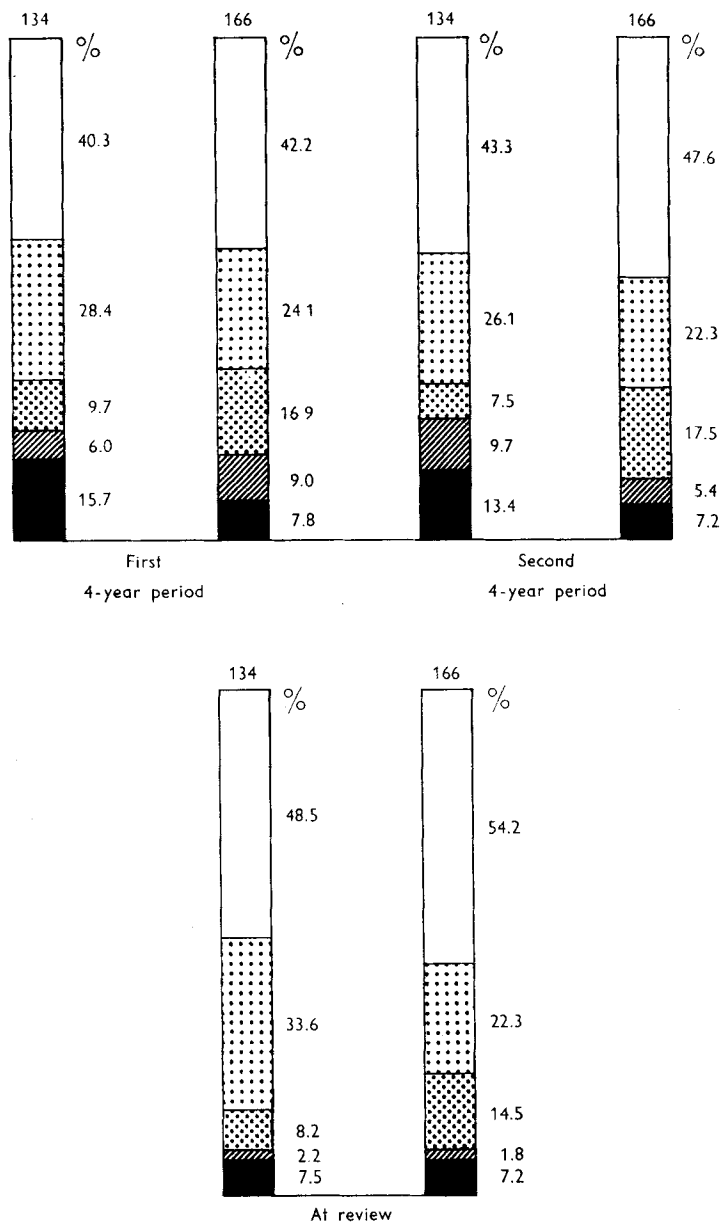
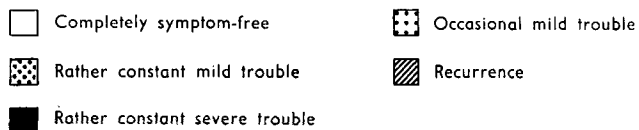


Diagram 8. Severity of trouble during first and second 4-year periods after hospitalisation and at time of review in heavy manual workers (134) and the remainder (166).



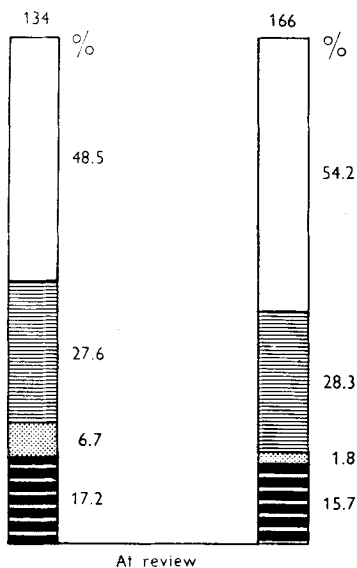
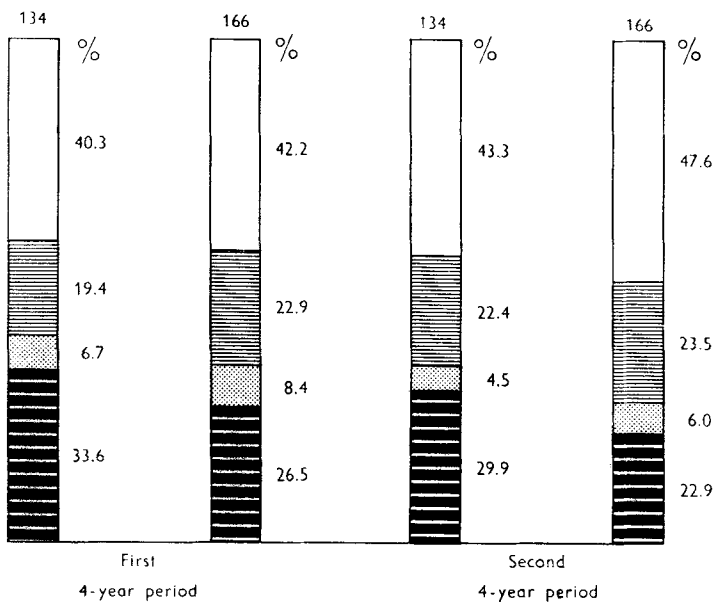


Diagram 9. Symptoms during first and second 4-year periods after hospitalisation and at time of review in heavy manual workers (134) and the remainder (166).



mentioned, the frequency of freedom from symptoms was found to be increased at the time of the review, this increase being due to a decrease in the number of patients with sciatic symptoms from the time of the second 4-year period to that of the review.

It might be of interest to give an account of the distribution of heavy manual workers and others among different age groups, because one might imagine an uneven distribution to be capable of influencing the results. As is clear from Table 22,

Table 22. Age distribution of 134 heavy manual workers and 166 light/not manual workers at the time of hospitalisation

Age in years	Heavy manual workers		Light/not manual workers	
	No.	Per cent	No.	Per cent
< 30	32	23.9	24	14.4
30 < 40	53	39.6	64	38.6
40 < 50	35	26.1	57	34.3
50 and over	14	10.4	21	12.7
Total	134	100.0	166	100.0

the heavy manual workers were somewhat over-represented in the lowest age group. However, an analysis of the entire material with respect to age at the time of hospitalisation showed no definite differences in the frequency of trouble and symptoms during the course after hospitalisation.

2. COMPARISON BETWEEN PATIENTS WITH "NORMAL", "SLIGHTLY CHANGED" AND "PRONOUNCEDLY CHANGED" BACK AT THE TIME OF THE REVIEW. — As pointed out earlier (page 49), at the review the patients were classed according to the state of the back into three groups: normal, slightly changed and pronouncedly changed back. The figures given in Diagrams 10 and 11 show a greater frequency of trouble in the last-men-

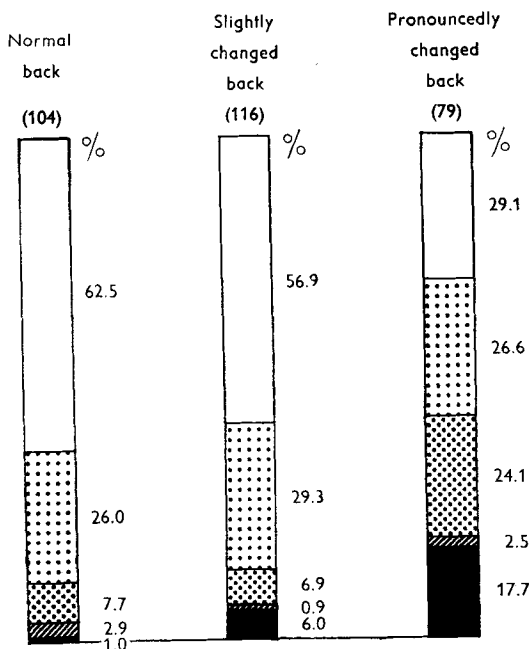
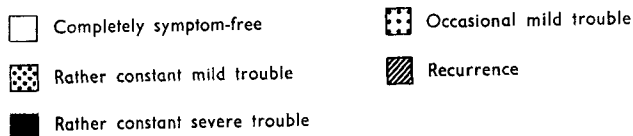


Diagram 10. Severity of trouble at time of review in 299 patients with normal, slightly changed, and pronouncedly changed back.



tioned group than in the other two. Among those with a pronouncedly changed back the frequency of only back symptoms was higher than in the others, while no definite difference was found for sciatic symptoms. These differences and similarities were also found on comparison between the first and second 4-year periods. Thus, during the first 4-year period 52 per cent of those with a normal back and 24 per cent of those with a pronouncedly changed back were completely symptom-free. The frequencies of only back symptoms were 15 per cent and 34 per cent.

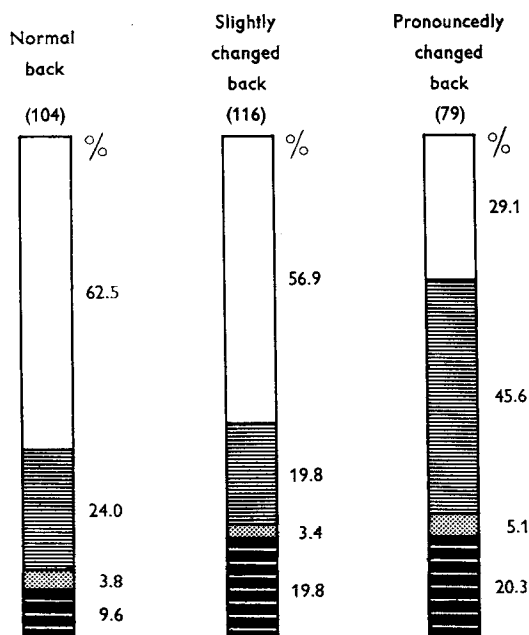


Diagram 11. Symptoms at time of review in 299 patients with normal, slightly changed, and pronouncedly changed back.



3. COMPARISON BETWEEN PATIENTS WHO HAD THE INITIAL ATTACK OF SCIATICA BELOW THE AGE OF 30, BETWEEN 30 AND 40 AND ABOVE 40. — One might ask whether the course of the disease after hospitalisation varies with the age of the patient at the initial onset of sciatica. This is accounted for in Diagrams 12 and 13, from which it is apparent that not true differences were demonstrable on comparison of the frequency of trouble and symptoms in the various age classes. It should be observed that these age figures refer to the initial onset of sciatica, which need not mean that these were the patients' ages at the time of hospitalisation. However, in 189 cases the time of hospitalisation was the same as that of the

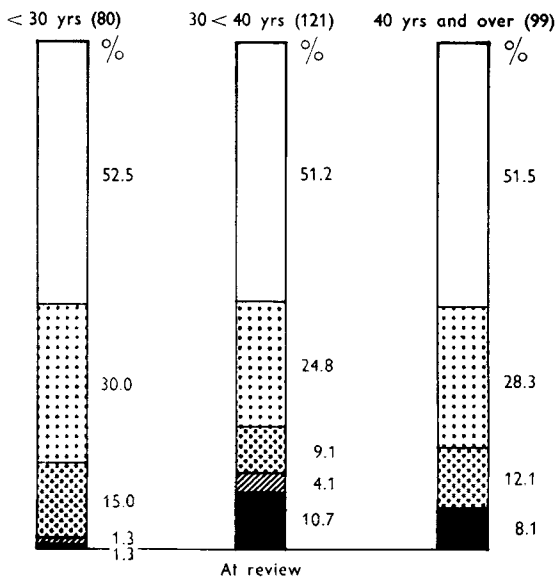
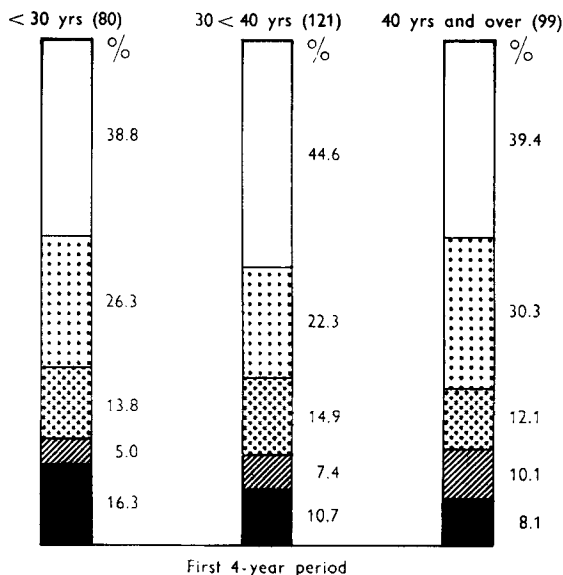
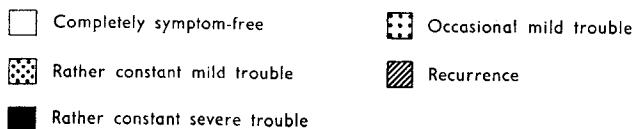
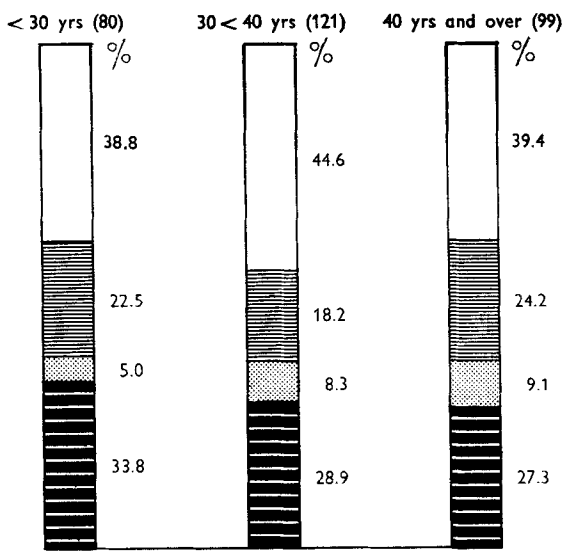
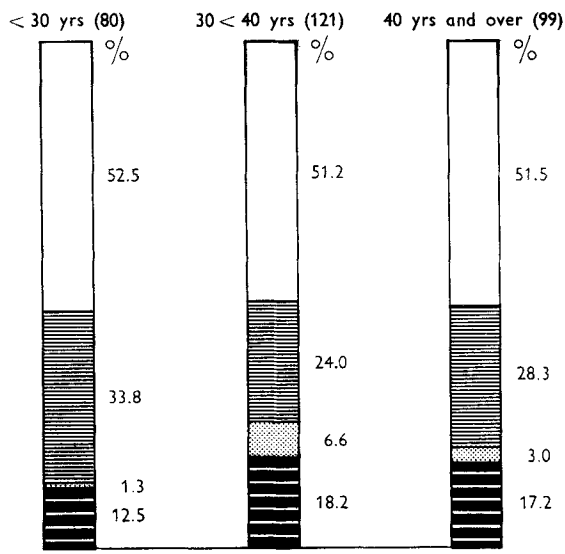


Diagram 12. Severity of trouble during first 4-year period and at time of review in patients with initial onset of sciatica before the age of 30, between 30 and 40, and over 40 years.





First 4-year period



At review

Diagram 13. Symptoms during first 4-year period and at time of review in patients with initial onset of sciatica before the age of 30, between 30 and 40, and over 40 years.

- ☐ Completely symptom-free
- ☒ Only back symptoms
- ☒ Only sciatic symptoms
- ☒ Both sciatic and back symptoms

Table 23. Interval between initial attack of sciatica and time of hospitalisation of patients grouped according to age at the time of initial onset

	< 30 years		30 < 40 years		40 years and over		Total	
	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
No earlier attack	40	50.0	76	62.8	73	73.7	189	63.0
Initial onset within 1 year of hosp.	3	3.8	7	5.8	12	12.1	22	7.3
Initial onset within 1 < 2 years of hosp.	9	11.2	10	8.3	2	2.0	21	7.0
Initial onset within 2 < 5 years of hosp.	7	8.8	8	6.6	3	3.0	18	6.0
Initial onset within 5 < 10 years of hosp. ...	9	11.2	7	5.8	5	5.1	21	7.0
Initial onset within 10 years and more of hosp.	12	15.0	13	10.7	4	4.1	29	9.7
Total	80	100.0	121	100.0	99	100.0	300	100.0

initial onset. As to the remaining 111, the interval between the initial onset and hospitalisation varied fairly widely, as is apparent from Table 23.

In this connection it might be convenient to give an account of the age periods during which the disease commenced. When the age at hospitalisation, below 30, 30 to 40 and above 40, was placed in relation to the age class, in which the initial onset was reported, it will give a rough impression of the duration of the history as well as information on the onset of the trouble in the entire material (Table 24). In 27 per cent the onset was dated to a time before the patients had reached the age of 30, in 40 per cent between the ages of 30 and 40 and in 33 per cent above 40.

Table 24. Age at initial onset and at time of hospitalisation

Age in years at hosp.	Age in years at initial onset					
	< 30		30 < 40		40 and more	
	No.	Per cent	No.	Per cent	No.	Per cent
< 30	56	100.0	—	—	—	—
30 < 40	18	15.4	99	84.6	—	—
40 and more	6	4.7	22	17.3	99	78.0
Total	80	26.7	121	40.3	99	33.0

4. COMPARISON BETWEEN EARLIER COMPLETELY SYMPTOM-FREE AND NOT SYMPTOM-FREE CASES. — As mentioned 189 patients had the initial onset of sciatica at the time of hospitalisation. Of these 189 patients, 104 had not had any sort of back symptoms either, in other words they had been completely symptom-free. On comparison of their trouble and symptoms during the later course in these 104 patients and the remaining 196 who had had symptoms earlier (Diagrams 14 and 15) the following observations were made. At the time of the review those who had earlier been completely symptom-free were more often so than the others. In these others, the frequency of rather constant mild trouble was significantly higher.

5. COMPARISON WITH RESPECT TO AGE AT ONSET IN 189 PATIENTS WITHOUT EARLIER SCIATIC SYMPTOMS. — If the 189 patients who had formerly not had sciatic symptoms are compared with regard to age at onset (time of hospitalisation) in the age groups below 30, 30 to 40 and above 40 (Diagrams 16 and 17), we see that the patients in the lowest age group during the first and second 4-year periods after hospitalisation showed a higher figure for trouble than the remainder, while at the time of the review the percentage of symptom-free was roughly the same. However, the three groups are not

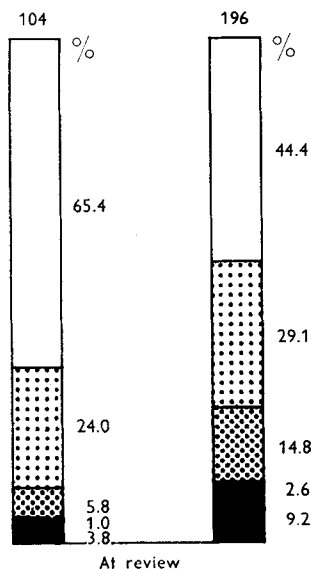
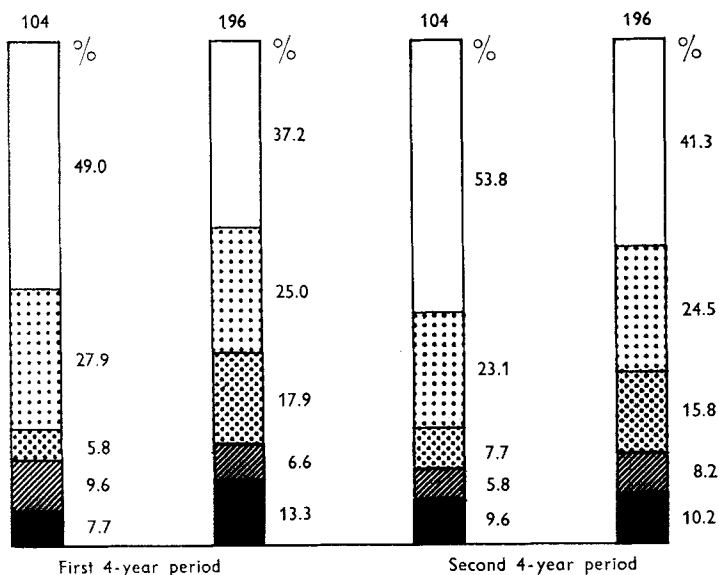


Diagram 14. Severity of trouble during first and second 4-year periods after hospitalisation and at time of review in 104 earlier completely symptom-free patients and 196 patients with earlier trouble.

- | | |
|--------------------------------|-------------------------|
| Completely symptom-free | Occasional mild trouble |
| Rather constant mild trouble | Recurrence |
| Rather constant severe trouble | |

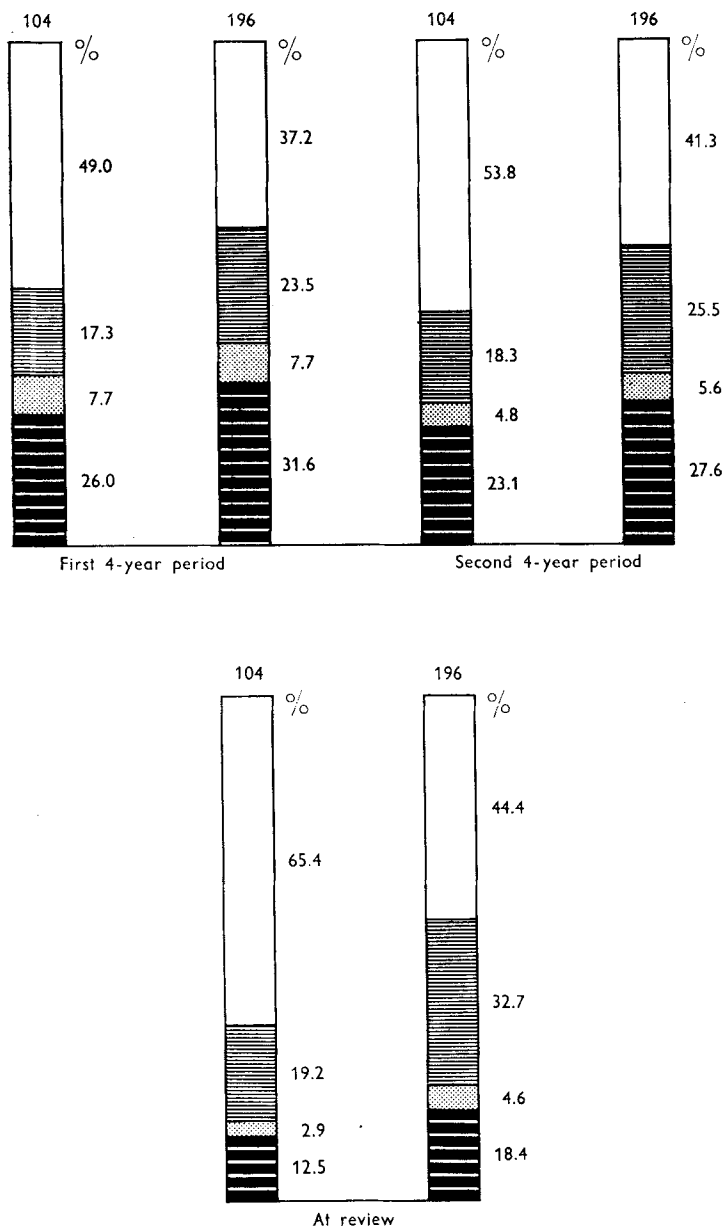
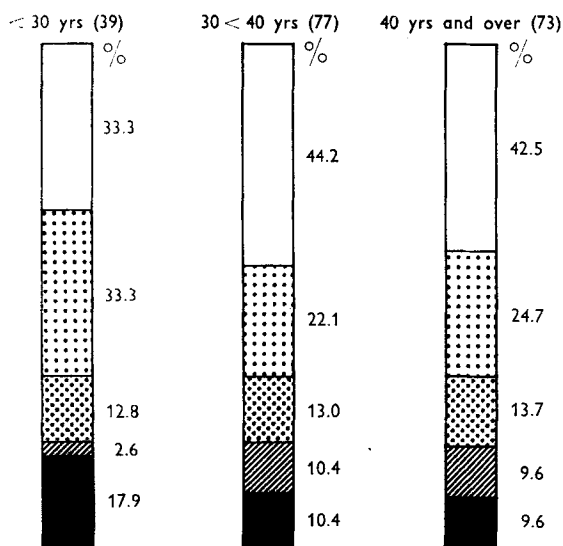
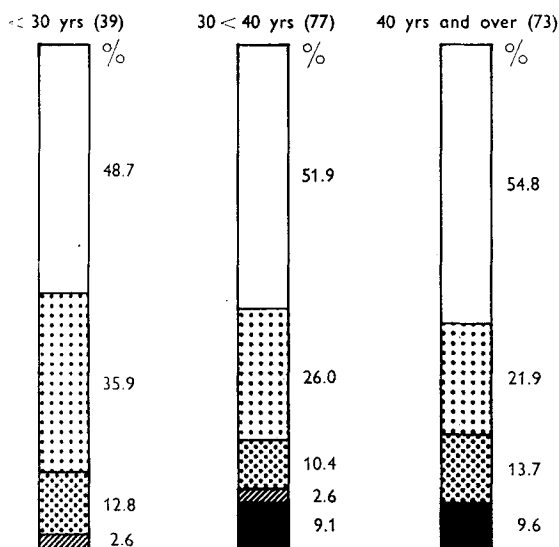


Diagram 15. Symptoms during first and second 4-year periods after hospitalisation and at time of review in 104 earlier completely symptom-free patients and 196 with earlier trouble.



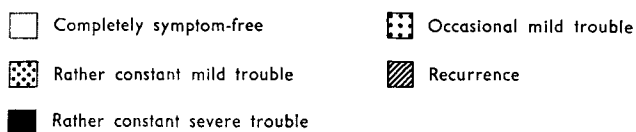


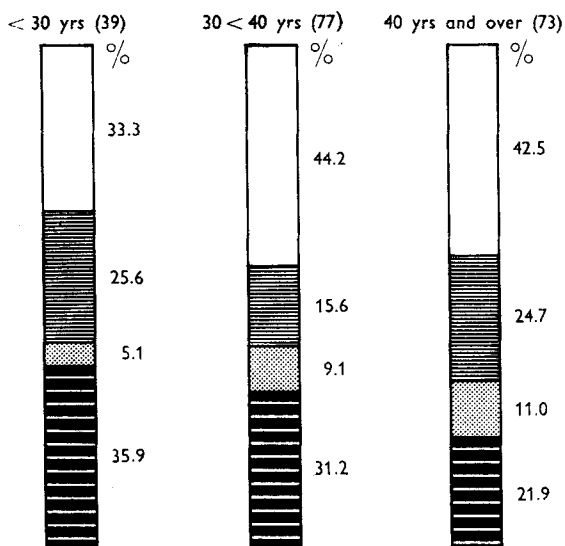
First 4-year period



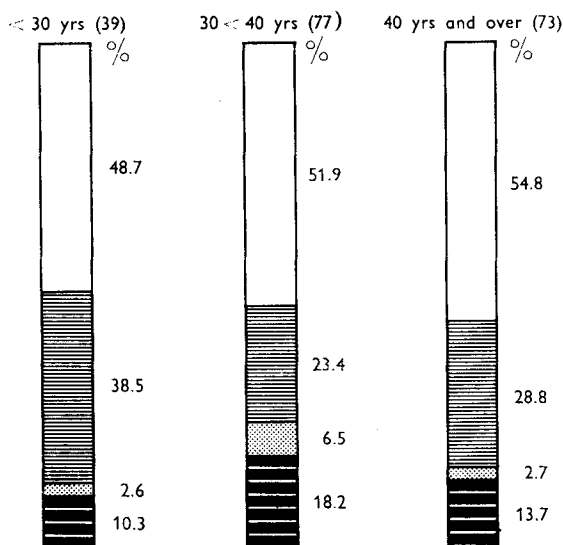
At review

Diagram 16. Severity of trouble during first 4-year period after hospitalisation and at time of review in 189 patients without earlier sciatica and who at the time of hospitalisation were less than 30, 30 to 40, and above 40 years.



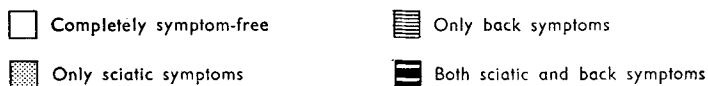


First 4-year period



At review

Diagram 17. Symptoms during first 4-year period after hospitalisation and at time of review in 189 patients without earlier sciatica and who at the time of hospitalisation were less than 30, 30 to 40 and above 40 years.



large enough to permit any valid conclusions about any differences between them.

6. COMPARISON WITH REGARD TO THE DURATION OF THE DISEASE AT THE TIME OF HOSPITALISATION OF 104 EARLIER SYMPTOM-FREE PATIENTS. — The 104 patients who had formerly been completely symptom-free deserve special mention. One might, for example, ask whether in a given case the duration of the disease at time of hospitalisation, which might be regarded as an indirect measure of the intensity of the symptoms or the severity of the disease, in this selected group might influence the later course. The patients were thus divided into three groups according to the duration of the disease at time of hospitalisation, less than 4 months, 4 to 8 months and more than 8 months. As to those cases, in which this time exceeded 8 months, it might be mentioned that in 9 the duration was 1 year, in 10 it was 1 to 2 years and in the remaining 2 still longer. No definite differences were found in the later course between those patients who had symptoms for less than 4 months, 4 to 8 months and more than 8 months.

It might be mentioned that the three age groups (below 30, 30 to 40 and above 40) showed an even distribution among the different durations of the disease at the time of hospitalisation. (Tables 25 and 26.) The patients' occupations (heavy manual workers and light/not manual workers) showed an even distribution for the 30 to 40 age class, but slight differences in this respect in the other two age classes.

II. CONDITION DURING AN 8-YEAR PERIOD AFTER HOSPITALISATION

The preceding section gave an account of the severity of the trouble and symptoms during different periods after hospitalisation and at the time of the review.

Here an analysis is given of the more uniform later course in 300 patients from hospitalisation until 8 years afterwards with respect to the severity and the nature of the trouble that was dominant throughout this period or the major part of it.

Table 25. Severity of trouble in relation to duration of the disease at the time of hospitalisation of 104 earlier completely symptom-free patients

	First 4-year period						At the review					
	< 4 mths		4 < 8 mths		8 mths and more		< 4 mths		4 < 8 mths		8 mths and more	
	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
Completely symptomfree	21	50.0	23	56.1	7	33.3	28	66.7	28	68.3	12	57.2
Occasional mild trouble	14	33.3	10	24.4	5	23.9	10	23.8	11	26.8	4	19.0
Rather constant mild trouble	1	2.4	1	2.4	4	19.0	2	4.7	2	4.9	2	9.5
Recurrence	5	11.9	4	9.8	1	4.8	1	2.4	—	—	—	—
Rather constant severe trouble	1	2.4	3	7.3	4	19.0	1	2.4	—	—	3	14.3
	42	100.0	41	100.0	21	100.0	42	100.0	41	100.0	21	100.0

Table 26. Symptoms in relation to duration of the disease at the time of hospitalisation of 104 earlier completely symptom-free patients

	First 4-year period						At the review					
	< 4 mths		4 < 8 mths		8 mths and more		< 4 mths		4 < 8 mths		8 mths and more	
	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
Completely symptom-free	21	50.0	23	56.1	7	33.3	28	66.6	28	68.3	12	57.1
Only back symptoms	7	16.7	6	14.6	5	23.9	7	16.7	8	19.5	5	23.8
Only sciatic symptoms	4	9.5	2	4.9	2	9.5	—	—	2	4.9	1	4.8
Both sciatic and back symptoms	10	23.8	10	24.4	7	33.3	7	16.7	3	7.3	3	14.3
	42	100.0	41	100.0	21	100.0	42	100.0	41	100.0	21	100.0

TERMINOLOGY. — Three terms were considered sufficient to give an adequate description of the condition of the patients.

A. SYMPTOM-FREE

B. RATHER CONSTANT MILD TROUBLE

C. RATHER CONSTANT MODERATE OR SEVERE TROUBLE

A. SYMPTOM-FREE (201). — To this group belong those patients who were *completely symptom-free* (111) and those who had *occasional mild trouble* (60). In the latter the trouble was regarded as so slight and sporadic that they could reasonably be regarded as practically symptom-free. This group also includes *patients with recurrences* (30) *who were otherwise completely symptom-free* (19) *or had occasional mild trouble* (11). It may seem incorrect to account for patients with recurrences in a category called symptom-free, but this was considered the most suitable because the other groups (B and C) corresponded still less to the later course in these cases.

With the exception of patients with recurrences and another 4 patients there were none in this group who had treatment for occasional symptoms and none who found it necessary to be absent from work and in none was the working capacity decreased. However, 5 patients took up lighter work after recovery.

B. RATHER CONSTANT MILD TROUBLE (36). — This group includes above all cases coinciding with the definition of group III in the preceding section. In most of the patients the trouble persisted throughout the 8-year period, though at times it might have been sporadic. The patients who are included in group B thus had permanent trouble of the type which in the preceding account assign the patient to group III or combinations of this and group II.

Periods of decreased working capacity or absence from work occurred and there were also some patients who went over to lighter work because of their trouble. On the whole, however, it might be said that the trouble caused only slight or no decrease in working capacity.

C. RATHER CONSTANT MODERATE OR SEVERE TROUBLE (63). — This group contains such cases as were defined as group V in the earlier section. But also cases according to the definition group III are included, mainly those with the relatively greatest trouble. Many of the patients had trouble of varying severity (III and V), which motivates the name of group C. It is sometimes difficult to draw a sharp line of distinction between such terms as mild, moderate and severe, and consequently it was sometimes questionable whether a case should be assigned to one group or another. In such cases, it was mainly the working capacity of the patient that decided the question into which group the patient was placed.

As to group C, working capacity was often partially or completely impaired at least periodically. The trouble increased in association with heavy work and sometimes made such work impossible. Some of the patients (small farmers), however, reported that despite sometimes fairly considerable trouble, they could carry on with heavy work. Some had to seek other kind of work less trying for the back. To this group belong those patients who were forced to wear a corset more or less constantly. The continuous wearing of a corset gave complete relief to some but only a certain improvement to others.

The dominating trouble and symptoms in the 300 patients during the first 8 years after hospitalisation are accounted for in Diagram 18. It is apparent from the diagram that 67 per cent were classified as symptom-free. *Completely symptom-free and without recurrences were 37 per cent (of 300)*. Occasional mild trouble without recurrence was noted in 20 per cent. The remaining 10 per cent consist of patients with recurrences who were otherwise completely symptom-free or had occasional mild trouble.

One third had constant more or less pronounced trouble throughout or during parts of the 8-year period. Sixty per cent of them had sciatic or both sciatic and back symptoms, as is apparent not only from Diagram 18 but also from Table 27, which summarises each trouble group separately with respect

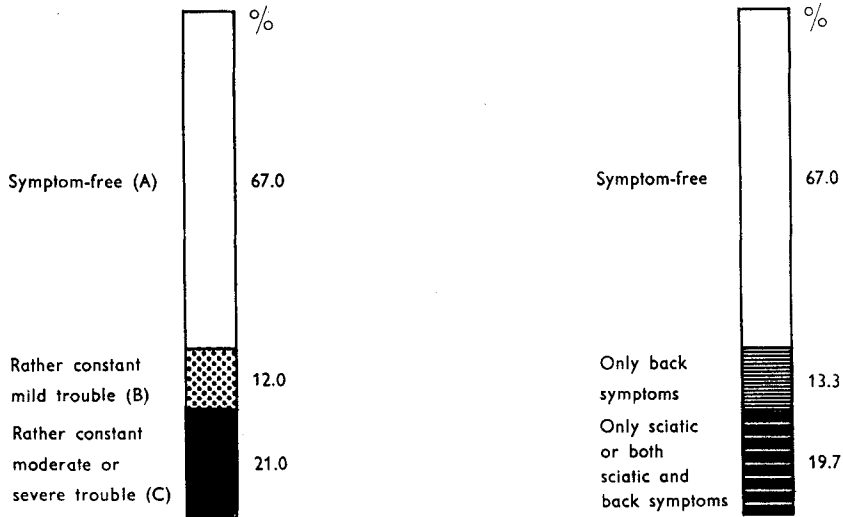


Diagram 18. Severity and nature of trouble in 300 patients during the 8-year period.

Table 27. Symptoms of 99 patients with rather constant trouble during the first 8 years after hospitalisation

Condition	Only sciatic symptoms		Only back symptoms		Both sciatic and back symptoms	
	No.	Per cent	No.	Per cent	No.	Per cent
Rather constant mild trouble (36 cases)	—	—	17	47.2	19	52.8
Rather constant moderate or severe trouble (63 cases)	4	6.3	23	36.5	36	57.1
Total	4	4.0	40	40.4	55	55.6

to the various symptoms. The frequency of recurrences for those with permanent trouble was at least 16 per cent. On comparison between males and females no significant differences

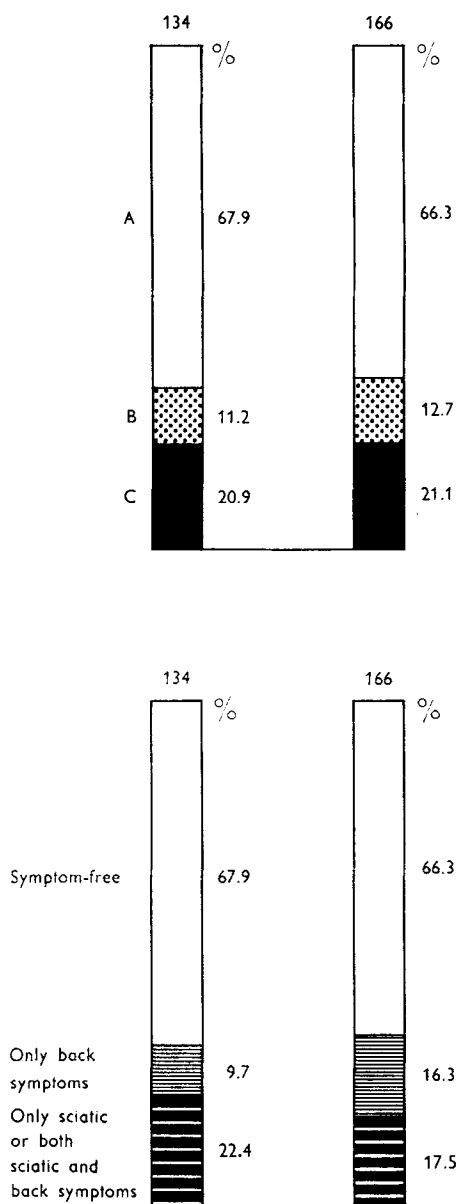


Diagram 19. Severity and nature of trouble during the 8-year period in heavy manual workers (134) and the remainder (166).

were demonstrable in the frequency of trouble, symptoms or recurrences during the 8-year period.

In the diagrams for the frequency of symptoms the patients with only sciatic symptoms and both sciatic and back symptoms have been taken together because of the smallness of the former group.

Below an account is given of the condition of the patients during the 8-year period from some of the points of view presented in the previous section.

1. COMPARISON BETWEEN HEAVY MANUAL WORKERS AND THE REMAINDER. — No statistical difference was found between heavy manual workers and others (light/not manual workers) (Diagram 19).

2. COMPARISON BETWEEN PATIENTS WITH "NORMAL", "SLIGHTLY CHANGED" AND "PRONOUNCEDLY CHANGED" BACK AT THE TIME OF THE REVIEW. — Comparison of the 8-year course in those who at the time of the review had a normal, slightly changed or pronouncedly changed back (Diagram 20) showed as follows. Among the patients with normal and slightly changed back the frequency of freedom from symptoms was higher than among those with a pronouncedly changed back. Group B (rather constant mild trouble) showed no difference between the various types but the frequency of the cases belonging to group C was highest among those with a pronouncedly changed back. As to the symptoms the frequency of only back symptoms was highest among those with a pronouncedly changed back. Moreover, sciatic symptoms were somewhat more common among those with a pronouncedly changed back than among those with a normal back.

3. COMPARISON BETWEEN EARLIER COMPLETELY SYMPTOM-FREE AND NOT SYMPTOM-FREE CASES. — As is apparent from Diagram 21 the frequency of freedom from symptoms in the later course was somewhat higher for the earlier completely symptom-free patients (104) than for those who had had symptoms earlier (196).

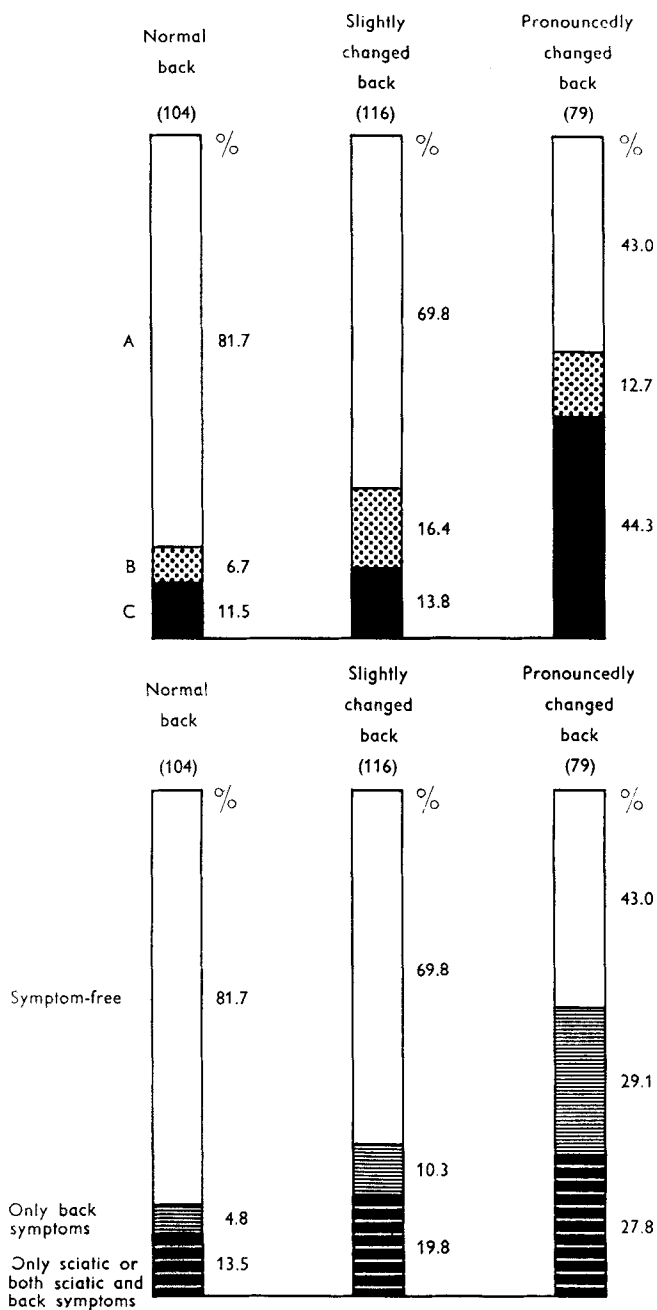


Diagram 20. Severity and nature of trouble during the 8-year period in 299 patients with normal, slightly changed, and pronouncedly changed back.

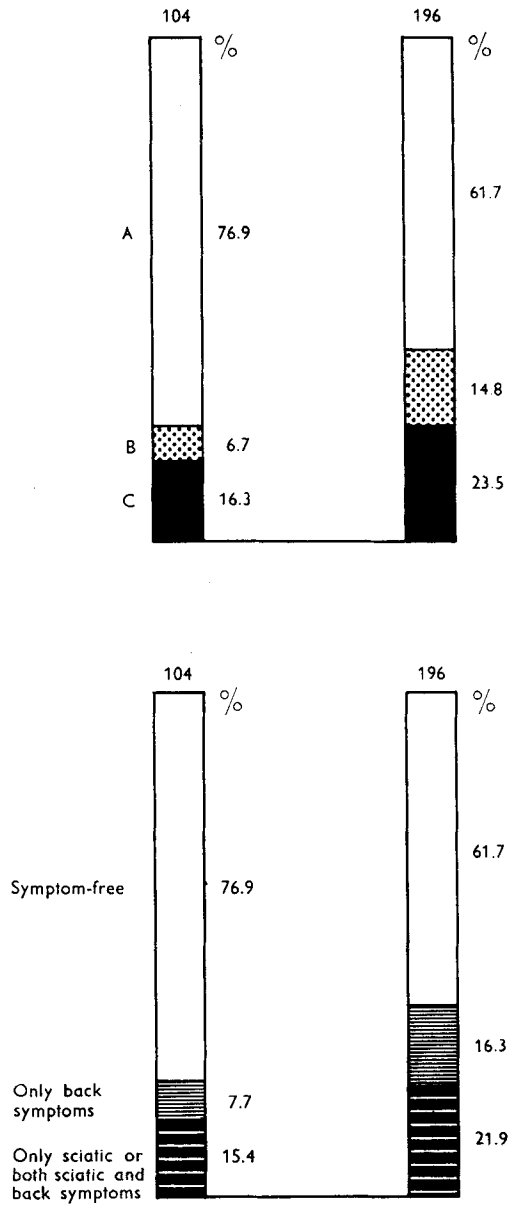


Diagram 21. Severity and nature of trouble during the 8-year period in 104 earlier completely symptom-free patients and 196 patients with earlier trouble.

4. ONE HUNDRED AND FOUR EARLIER COMPLETELY SYMPTOM-FREE PATIENTS WERE COMPARED

a) *with respect to the duration of the disease at time of hospitalisation.* — When 104 patients who had earlier been completely symptom-free were compared in this respect (Table 28), the frequency of freedom from symptoms during the 8-year period was highest for those with the shortest duration (less than 4 months). The statistical significance is, however, extremely weak. Owing to the smallness of the groups no valid conclusions can be drawn concerning the severity and nature of the trouble in relation to the duration of the disease at time of hospitalisation.

b) *with respect to age at initial onset.* — When the later course was compared with the age of the patients at the time of onset (below 30, 30 to 40 and above 40 years), no significant differences were found between the age groups regarding the trouble or symptoms (Table 29).

III. COMPARISON OF THE COURSE OF THE DISEASE IN CASES WITH AND WITHOUT INDICATIONS FOR OPERATION

If it be supposed that the cause of sciatica in the present material is a disc protrusion, a question now would be in which of the present cases with a specially serious course operation might have been contemplated. It was therefore considered of interest to classify the material from this point of view in order to compare the later course of those cases in which operation was, according to the writer, indicated at the time of hospitalisation and those in which operation was not indicated. It is, of course, difficult in retrospect to judge whether or not a given case should have been operated upon, because only personal contact with the patient and personal examination can provide a reliable basis for such a decision. Here, however, the decision could be made only on data obtained from the record sheets.

Indications for operation were said to be those now generally applied at the Orthopedic Department, Malmö General Hospi-

Table 28. Severity and nature of trouble during the first 8 years in 104 earlier completely symptom-free patients in relation to the duration of the disease at the time of hospitalisation

Duration of the disease at time of hosp.	Symptom-free		Rather constant mild trouble		Rather constant moderate or severe trouble		Only back symptoms		Only sciatic symptoms		Both sciatic and back symptoms	
	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
Months												
< 4	36	85.7	2	4.8	4	9.5	3	7.1	1	2.4	2	4.8
4 < 8	32	78.0	3	7.3	6	14.6	2	4.9	—	—	7	17.1
8 and more	12	57.1	2	9.5	7	33.3	3	14.3	1	4.8	5	23.8

Table 29. Severity and nature of trouble during the first 8 years in 104 earlier completely symptom-free in relation to age at onset

Age in years at time of hosp.	Symptom-free		Rather constant mild trouble		Rather constant moderate or severe trouble		Only back symptoms		Only sciatic symptoms		Both sciatic and back symptoms	
	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
< 30	19	67.9	3	10.7	6	21.4	5	17.9	—	—	4	14.3
30 < 40	33	82.5	2	5.0	5	12.5	—	—	1	2.5	6	15.0
40 and over	28	77.8	2	5.6	6	16.7	3	8.3	1	2.8	4	11.1

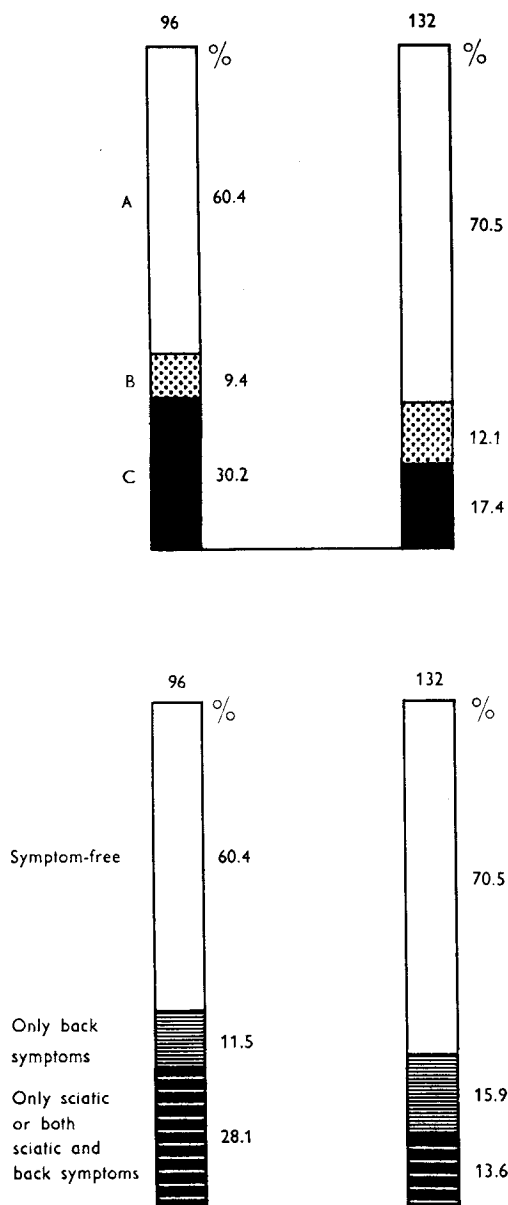


Diagram 22. Severity and nature of trouble during the 8-year period in 96 patients with and 132 patients without indications for operation.

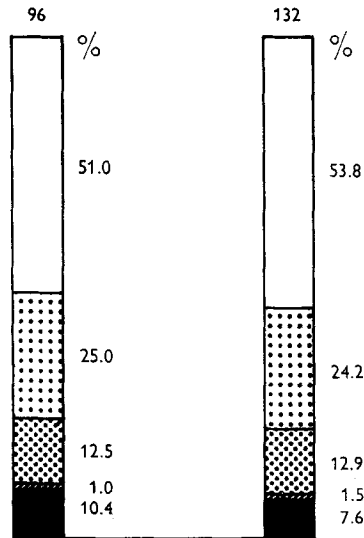
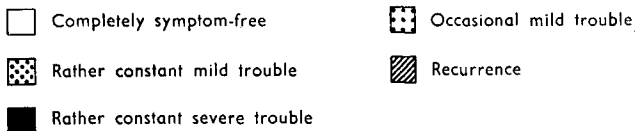


Diagram 23. Severity of trouble at time of review in 96 patients with and 132 patients without indications for operation.



tal, namely above all severe persistent pain despite treatment with rest or bed-rest for a period of about 2 months. Earlier attacks of the disease, a strongly positive Lasègue's sign and the occurrence of paresis were also regarded as manifestations strengthening the indications.

With these criteria it was considered that 96 patients should have been operated on. As to the rest of the material, it appeared that no definite indications were present for operative treatment in 132 cases.

On comparison of the two categories no definite differences were found in the frequency of freedom from symptoms or severity of the trouble during the first 8 years after hospitalisation (Diagram 22). For the cases with indications for operation, however, a slightly higher frequency of sciatica was found.

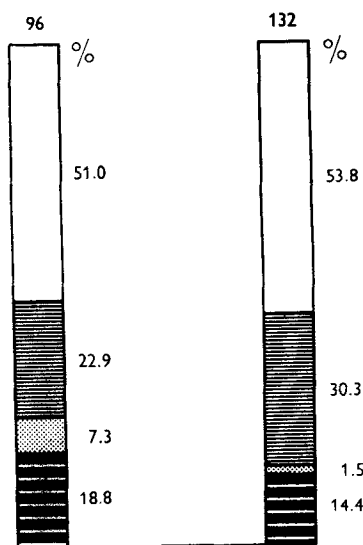


Diagram 24. Symptoms at time of review in 96 patients with and 132 patients without indications for operation.



At the review (which refers to the condition of the patient during the last 2 years before) no differences were found in any respects (Diagrams 23 and 24).

The frequency of recurrences which during the first, second and third 4-year periods lay between 4 per cent and 8 per cent showed no statistically significant differences between the two groups for these periods or for the entire period from hospitalisation until the review.

The cases with indications for operation were, however, more unfavourable from other points of view. The entire duration of the disease from the day of admission and including those periods in the later course during which the trouble was so severe that bed-rest or physical therapy of some sort was considered necessary, was longer for these cases. This also implied

longer loss of working capacity. In these cases working capacity was more frequently permanently reduced or the patients were obliged to seek lighter work. An analysis of these data is given in Table 30 where the figures designate approximate mean values for the two groups.

Table 30. Duration of the disease, disability and persistent impairment of working capacity in cases with and without indications for operation as from admission to the review

	Average duration of the disease in months	Average disability in months	Persistent impaired working capacity in per cent
Cases with indications for op. (96)	7.1	6.5	16.7
Cases without indications for op. (132)	4.4	3.9	7.6

The remainder of the material, 72 patients, did not fulfil the requirements described as indications for operation but were on the other hand conceived as cases with decidedly more serious trouble than those where operation was not regarded as indicated. There is reason to suppose that with a somewhat wider range of indications in about half of these cases operation might have been seriously considered.

For these cases in which indications for operation were doubtful the percentages in all the respects mentioned above were on the whole somewhere between the figures for cases with and without indications for operation.

IV. THE OPERATED CASES

As mentioned earlier, of the 310 patients (admitted in 1930—1945) 10 were operated upon after 1945 because of a recurrence. Nine of them had sciatica at the time of the operation and they were operated upon under the diagnosis of disc pro-

trusion. One patient had only lumbago which was, however, severe and prolonged.

The interval between the time of hospitalisation and the appearance of the recurrence for which the patient was operated upon was less than 2 years in 2 cases, 2 to 7 years in 3 cases and 7 to 11 years in 5 cases.

It should be pointed out that in 8 of the 9 patients operated on under the diagnosis of disc protrusion, the findings were definitely positive.

The interval between the operation and the review was 3 months for one case and 2 to 7 years in the remainder.

Post-operative recurrences occurred in 2 cases.

At the time of the review 2 patients were completely symptom-free, 3 had occasional mild trouble, 2 had rather constant mild trouble and the remaining 3 had rather constant severe trouble.

The number of patients operated upon is too small to permit any valid conclusions on the basis of comparisons with those treated conservatively.

Brief notes on these 10 patients operated upon are given below, where the ages refer to the patients' ages at the time of hospitalisation.

205. ♀, 21 years. Earlier symptom-free. Admitted 1941 because of Kyphoscoliosis lumbalis+Ischias dx. No recurrence of sciatica. Completely symptom-free until 1952, when severe lumbago occurred. Admitted because of Degeneratio disci intervertebralis L5-S1. Op.: Lumbo-sacral osteosynthesis with free bone transplantation. No back trouble since.

217. ♂, 22 years. Earlier symptom-free. Admitted 1942 because of Ischias sin. Later rather constant mild trouble in leg. No back trouble. Acute deterioration in 1951. Admitted because of Hernia disci intervertebralis L5-S1. Op.: Extirpation of disc prolapse L5-S1. The mild leg trouble persisted as before the recurrence.

218. ♂, 24 years. Earlier symptom-free. Admitted 1943 because of Lumbago-ischias. After short symptom-free interval mild recurrence in 1945. Severe recurrence in 1946. Admitted because of Prolapsus disci intervertebralis L4-L5. Op.: Extirpation of disc prolapse L4-L5 dx. Recovered after 6 months. Since then occasional mild trouble on exertion.

320. ♀, 32 years. Frequent attacks of lumbago during last few years. Admitted in 1936 because of Ischias sin. Not well on return home. Alternating improvement and recurrences up to 1941. Completely symptom-free 1941 to 1947. Recurrence 1947. Admitted because of Protrusio disci intervertebralis lumbosacralis. Op.: Decompressive laminectomy L4-L5 and L5-S1 sin. (protrusion of fourth and fifth lumbar discs). No sciatica since. Only occasional mild back trouble on exertion.

368. ♀, 36 years. During last 3 years lumbago once a year. Admitted 1937 because of Ischias. Since then symptom-free until 1947. Recurrence 1947. Admitted because of Prolapsus disci intervertebralis L4-L5. Op.: Extirpation of disc protrusion L4-L5. Slow improvement, one year's convalescence. Afterwards occasional mild back and leg trouble mainly in association with heavy work.

391. ♂, 36 years. Lumbago-ischias one year before. Admitted 1943 because of Ischias dx. Since then symptom-free until 1947. Recurrence 1947. Admitted because of Prolapsus disci intervertebralis L4-L5. Op.: Extirpation of perforated prolapse L4-L5. Since then right leg has given no symptoms but during the last year sciatica on left side, for which he is receiving treatment (corset).

392. ♂, 39 years. Earlier attacks of lumbago-ischias for which admitted 3 years and 1 year before. Freedom from symptoms between attacks. Admitted 1941 because of Lumbago-ischias. Since then symptom-free until 1949, when he had a recurrence. Admitted because of Ischias sin. Op.: Explorative laminectomy (operative findings uncertain). Op.-complication: severe peroneus paresis which persists unchanged. Since then rather constant severe trouble, mainly in the leg. Impaired working capacity since operation in 1949.

417. ♀, 43 years. Earlier symptom-free. Admitted 1942 because of Ischias sin. Since then no symptoms from left leg. 1948 Lumbago-ischias dx. Admitted because of Hernia disci lumbosacralis. Op.: Extirpation of disc protrusion L5-S1. Since then symptom-free.

472. ♂, 46 years. Lumbago attacks the last few years. Admitted 1945 because of Lumbago-ischias (Spondylosis deformans, L5-syn-drome). No improvement. Trouble persisted with decreased working capacity. Admitted 1947 because of Hernia nuclei pulposi L4-L5 sin. Op.: Extirpation of disc protrusion L4-L5. Afterwards occasional mild trouble mainly in cold weather. Acute deterioration in summer 1953, when he was admitted to hospital. Since then rather constant mild leg trouble.

473. ♂, 46 years. Mild lumbago-ischias 11 years earlier, but otherwise symptom-free. Admitted 1944 because of Lumbago-ischias. Since then rather constant moderate or severe trouble until 1951, when he had an acute deterioration. Admitted because of Hernia disci inter-

vertebralis lumbosacralis. Op.: Extirpation of lumbosacral disc protrusion L5-S1. Since then no sciatica but rather constant severe back trouble. Cannot manage without corset.

V. COURSE OF THE DISEASE FROM ONSET TO THE TIME OF THE REVIEW

In the foregoing an account was given of the frequency of trouble and symptoms during various periods as from hospitalisation as well as of the dominant trouble and symptoms during the first 8 years of the later course. This, however, is not enough to give a complete picture of the disease from its onset up to the time of the review. Another factor to be taken into consideration is the frequency of earlier attacks of sciatica or back trouble. Furthermore, what these factors as well as the attack for which the patient was admitted and later recurrences implied in terms of hospital care, total duration of the disease and disability merited analysis. It was also considered of special interest to analyse the frequency of recurrences from some other points of view.

In an attempt to give a detailed and at the same time ready continuous survey of these factors it was found rational to divide the material in the same way as in the account given in the preceding section. Thus, on the basis of the groups A, B and C, a complementary investigation was made of the disease before and after hospitalisation.

THE TIME BEFORE HOSPITALISATION

The earlier occurrence of only back symptoms (lumbago or insufficiencia dorsi) and radiating symptoms, the frequency for which the patients had earlier been cared for in hospital because of these symptoms, and the occurrence of any disability are accounted for in Table 31. It should be mentioned that the number of those with earlier radiating symptoms (111 patients) includes cases in which the patients had had proper sciatica of such severity as was defined as recurrence

Table 31. Earlier symptoms, hospital care and disability of 300 patients

Group	No earlier symptoms		Only back symptoms		Radiating symptoms		Hospital care		Disability	
	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
A (201)	80	39.8	46	22.9	75	37.3	35	17.4	81	40.3
B (36)	7	19.4	14	38.9	15	41.7	9	25.0	18	50.0
C (63)	17	27.0	25	39.7	21	33.3	12	19.0	27	42.9
Total	104	34.7	85	28.3	111	37.0	56	18.7	126	42.0

(70 per cent) and cases in which the patients had only had mild sciatic symptoms.

THE TIME OF HOSPITALISATION

Duration of the disease at time of hospitalisation. The interval from the onset of the disease until recovery at time of hospitalisation is accounted for in Table 32. This period was found to be shortest for those who were symptom-free for 8 years afterwards (A). In 42 per cent of these, the duration of the symptoms was less than 4 months, the corresponding figures for groups B and C being 33 per cent and 22 per cent. Of group A, the duration of the disease was more than 9 months for 15 per cent. The corresponding figures for groups B and C were higher, 28 per cent and 38 per cent. The differences found between groups A and C were statistically significant.

For nearly half of all (49 per cent) the duration of the symptoms was less than 5 months. As a complement to Table 32 it might be mentioned that of the 9 patients who had symptoms for more than 2 years, it was 25 to 30 months in 4 and that the longest duration of the disease at time of hospitalisation was as much as 42 months.

Table 32. *Duration of the disease at the time of hospitalisation*

Duration of the disease at time of hosp. Months	Group A		Group B		Group C		Total	
	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
< 1	2	1.0	—	—	—	—	2	0.7
1 < 2	24	11.9	5	13.9	3	4.8	32	10.7
2 < 3	28	13.9	2	5.6	7	11.1	37	12.3
3 < 4	31	15.4	5	13.9	4	6.3	40	13.3
4 < 5	24	11.9	5	13.9	6	9.5	35	11.7
5 < 9	62	30.9	9	25.0	19	30.2	90	30.0
9 < 12	10	5.0	3	8.2	6	9.5	19	6.3
12 < 24	16	8.0	5	13.9	15	23.8	36	12.0
24 and more	4	2.0	2	5.6	3	4.8	9	3.0
	201	100.0	36	100.0	63	100.0	300	100.0

Duration of disability at time of hospitalisation is apparent from Table 33. In most patients the duration of disability varied with the duration of the disease at time of hospitalisation. In some cases the duration of the disability was relatively short compared with the duration of the disease; the patients had begun to work despite persistent trouble. It should be pointed out that about half of the patients consisted of ambitious workers belonging to the rural population. Furthermore, the fact that during those years (1930—1945) lumbago-ischias was not regarded as a condition that might have been due to an accident and entitle the patient to compensation might also have contributed to the relatively early return to work.

For somewhat more than half the disability lasted for less than 4 months, and for four fifths less than 7 months. The longest duration of disability was 3 ¹/₂ years.

Table 33. Disability of 300 patients during the disease at the time of hospitalisation

Months	No.	Per cent
< 1	10	3.3
1 < 2	66	22.0
2 < 3	49	16.3
3 < 4	38	12.7
4 < 5	30	10.0
5 < 6	26	8.7
6 < 7	24	8.0
Total < 7 months	243	81.0
7 < 12	39	13.0
12 < 24	14	4.7
24 and more	4	1.3
Total	300	100.0

The duration of hospital care was accounted for earlier (page 45).

THE TIME AFTER HOSPITALISATION

As mentioned earlier, in group A recurrences appeared in 30 of the patients (15 per cent of 201) during the first 8 years after hospitalisation. Of these, 24 had only one recurrence, the remainder two or more. During the interval after the 8-year period until the time of the review 8 per cent of group A had further recurrences. Such recurrences were also noted in 7 per cent of the earlier completely symptom-free (111).

Recurrences between hospitalisation and the time of the review occurred in 19 per cent of group B and in 24 per cent of

group C. The frequency of recurrences in group C was highest, but in reality it was probably still higher than the figures given. In the most serious cases in this group (those who were assigned to group V in the analysis of frequency of trouble) it was difficult to decide what should be regarded as recurrence when the course of the disease was on the whole poor for a long time, and exacerbations of the trouble therefore difficult to distinguish from recurrences.

The frequency of recurrences after hospitalisation until the review was at least 21 per cent for the entire material (300 patients).

It was of particular interest to determine whether the frequency of recurrences after hospitalisation until the review differed on comparison of different groups from the same points of view as those accounted for earlier. It is apparent from Table 34 that the variation in the frequency of recurrences was small. In none of the various groups compared were any statistically significant differences demonstrable.

Table 34. Recurrences after the time of hospitalisation

	Per cent
Males (199)	20.1
Females (101)	22.8
Heavy manual workers (134)	20.9
Light/not manual workers (166)	21.1
Patients with normal back (104)	21.2
Patients with slightly changed back (116)	23.3
Patients with pronouncedly changed back (79)	17.7
Patients with initial onset of sciatica before the age of 30 (80)	17.5
Patients with initial onset of sciatica aged 30 < 40 (121)	27.3
Patients with initial onset of sciatica aged 40 and over (99)	16.2
Earlier completely symptom-free (104)	20.2
With earlier trouble (196)	21.4
With indications for operation (96)	21.9
Without indications for operation (132)	20.5

Is there reason to suppose that the risk of recurrence appreciably decreases after the lapse of a certain number of years? The answer to this question is given in Table 35. The 69 patients accounted for there had all had a single recurrence (as from the first attack of sciatica). Up to 5 years after the initial onset most recurrences appeared and during this time no appreciable differences in recurrence per year were noted. From then on the frequency of recurrences decreased. Thirteen patients had, however, recurrences more than 10 years after hospitalisation, and 3 of them after such a long symptom-free period as 20 years.

As to the frequency of recurrences from the onset of the disease until the time of the review, it will be apparent from Table 36 that 60 per cent (181) of 300 patients had sciatica (satisfying the requirements of bed-rest and/or disability as

Table 35. Interval between initial onset and only recurrence in 69 patients

	No.	Per cent
< 4 mths	6	8.7
4 < 7 „	4	5.8
7 < 12 „	3	4.3
1 < 2 yrs	10	14.5
2 < 3 „	6	8.7
3 < 4 „	7	10.2
4 < 5 „	7	10.2
5 < 6 „	4	5.8
6 < 10 „	9	13.0
10 yrs and more	13	18.8
Total	69	100.0

Table 36. Frequency of recurrences in 300 patients

Recurrences	Males		Females		Total	
	No.	Per cent	No.	Per cent	No.	Per cent
None	120	60.3	61	60.4	181	60.3
1	44	22.1	25	24.7	69	23.0
2	21	10.6	14	13.9	35	11.7
3	9	4.5	—	—	9	3.0
3 and more	5	2.5	1	1.0	6	2.0
Total	199	100.0	101	100.0	300	100.0

defined earlier) on only one occasion, in other words, the disease recurred in 40 per cent. It is also clear from the table that the frequency of one and of two recurrences was roughly the same among males and females. Only 43 of these 181 patients had a single attack of the disease and had had no trouble at all before or since that time. This implies that *only 14 per cent of the entire material had sciatica on one occasion and had otherwise been completely symptom-free.*

Apart from recurrences those who were completely symptom-free during the first 8 years after hospitalisation were on the whole completely symptom-free also from then until the review. At the time of the review only 9 per cent had trouble of some type, a figure which in view of the size of the material is, however, significantly different from 0 per cent. Some of the remainder in the symptom-free group (occasional mild trouble) gradually became completely free from symptoms and at the time of the review this figure was 41 per cent. This also applied, though to a less extent, for those with more serious trouble (Groups B and C), as is apparent from Diagram 25, which shows the severity of trouble for groups A, B and C at the time of the review. The improvement to complete freedom from symptoms that occurred in groups B and C was significantly different from 0 per cent.

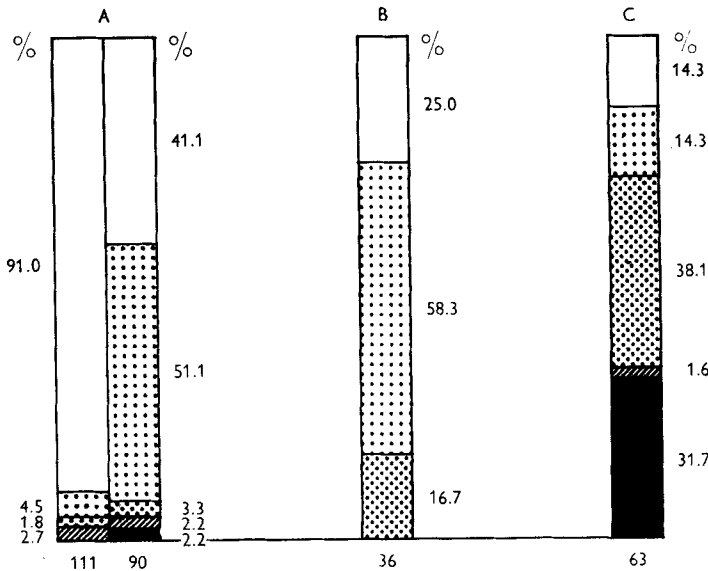


Diagram 25. Severity of trouble at time of review in various groups of the material.

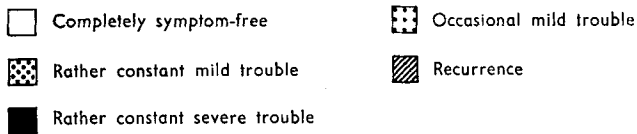


Table 37. Frequency of hospital care and disability of 300 patients after hospitalisation

	A (201)		B (36)		C (63)		Total	
	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
Hospital care	11	5.5	3	8.3	10	15.9	24	8.0
Disability	42	20.9	6	16.7	22	34.9	70	23.3

The frequency of *hospital care* and *disability* because of the disease after hospitalisation are accounted for in Table 37.

The consequences, *i. e.*, hospital care and disability, which sciatica is capable of causing because of its frequently prolonged course and tendency to recur, are of such dimensions as to be of social economic importance. It was therefore thought of interest to analyse the present material from this point of view.

The figures given refer to *the total periods from the initial onset of the disease until the time of the review.*

Total periods of hospital care. — These are given in Table 38. The longest two periods were 18 and 26 months. For 66 per cent the time in hospital, however, did not exceed 2 months and for 56 per cent it was 1 to 3 months.

The average duration of hospital care for the material as a whole was 2.1 months.

Total periods of the disease. — These are to be understood as the total duration of one or more periods during which the patients had trouble of such serious nature that it made bed-rest necessary and/or completely disabled the patients during the entire or part of the periods under consideration.

Table 38. Total periods of hospital care of 300 patients

Hospital care in months	No.	Per cent
< 1	78	26.0
1 < 2	121	40.4
2 < 3	48	16.0
3 < 4	25	8.3
4 < 5	7	2.3
5 < 6	6	2.0
6 < 12	11	3.7
12 and more	4	1.3
Total	300	100.0

Table 39. Total periods of the disease

	Males		Females		Total
	No.	Per cent	No.	Per cent	Cumulative per cent
< 1 mth	—	—	1	1.0	0.3
1 < 2 mths	9	4.5	3	3.0	4.3
2 < 3 „	23	11.6	5	5.0	13.6
3 < 4 „	13	6.5	14	13.9	22.6
4 < 5 „	16	8.0	8	7.9	30.6
5 < 6 „	19	9.5	6	5.9	38.9
6 < 7 „	11	5.5	9	8.9	45.6
7 < 8 „	9	4.5	7	6.9	50.9
8 < 9 „	20	10.1	3	3.0	58.6
9 < 10 „	8	4.0	9	8.9	64.3
10 < 11 „	9	4.5	3	3.0	68.3
11 < 12 „	8	4.0	3	3.0	72.0
1 < 2 yrs	36	18.1	25	24.8	92.3
2 < 3 „	13	6.5	2	2.0	97.3
3 < 4 „	3	1.5	2	2.0	99.0
4 years and more	2	1.0	1	1.0	100.0

For acceptance of a patient in the analysis he must have been disabled for a period of at least 2 weeks at a time. When neither bed-rest nor disability during at least this period was noted, periods of often fairly considerable trouble were not included in the analysis. In some of the cases it was difficult to determine the periods of the disease, and the figures given are therefore only approximative. In view of the fact that the require-

ments for acceptance were considerable (bed-rest, disability) these figures can, however, be regarded as representing the minimum value for the total periods of the disease.

From Table 39 it is apparent that these periods for about one third was less than 5 months. Half had a duration of less than 8 months, and as many as 28 per cent (84 patients) more than 1 year. Of these, 61 patients (20 per cent) had the disease for 1 to 2 years and 15 (5 per cent) between 2 and 3 years. Eight had a still longer period, the longest reported being as much as 8 years, during which time the patient was completely disabled for at least 3 years and had markedly decreased working capacity for the rest of the time. This patient had also spent the longest time in hospital — over 2 years.

The average total duration of the disease was 10.4 months.

Total periods of disability. — The duration of disability, which is accounted for in Table 40, was shorter than the periods given for the duration of the disease; the patients began to work despite persistent trouble of more or less severity. Almost half (47 per cent) were disabled for more than 6 months and 15 per cent (44 cases) for more than 1 year. The longest period of disability was as much as 5 years. The major part of this period of disability antedated the time of hospitalisation.

The total duration of disability among the 300 patients was 180 years, which implies a mean value of 7.2 months per patient.

An invalid pension (in Sweden granted to patients with less than one third of normal working capacity) because of prolonged trouble with markedly decreased working capacity was, however, granted only to one patient.

As to the total duration of the disease and of complete disability, it should be mentioned that the information given by the patient at the review was sometimes less definite — they could not state any exact figures. This applies above all to the older patients and to those who had been disabled long ago. Therefore, it cannot be claimed that the data given are exact, but it would appear that they nevertheless provide an acceptable expression of the consequences of the disease in these respects.

Table 40. Total periods of disability

	Males		Females		Total
	No.	Per cent	No.	Per cent	Cumulative per cent
< 1 mth	4	2.0	2	2.0	2.0
1 < 2 mths	17	8.5	13	12.9	12.0
2 < 3 „	26	13.1	16	15.8	26.0
3 < 4 „	22	11.1	10	9.9	36.7
4 < 5 „	21	10.6	9	8.9	46.7
5 < 6 „	15	7.5	5	5.0	53.4
6 < 7 „	16	8.0	14	13.9	63.4
7 < 8 „	10	5.0	5	5.0	68.4
8 < 9 „	18	9.0	5	5.0	76.1
9 < 10 „	7	3.5	3	3.0	79.4
10 < 11 „	7	3.5	4	4.0	83.1
11 < 12 „	5	2.5	2	2.0	85.4
1 < 2 yrs	22	11.1	12	11.9	96.7
2 < 3 „	6	3.0	—	—	98.7
3 < 4 „	2	1.0	1	1.0	99.7
4 years and more	1	0.5	—	—	100.0

A ready survey of some important data presented in the latter part of this section is given in tabular form (Table 41) with data on the disease at time of hospitalisation as well as on its previous and subsequent course up to the time of the review. Data on working capacity after the time of hospitalisation refer to patients who afterwards took up a lighter occupation or who returned to their usual occupation but with decreased working capacity.

Table 41. Survey of findings

	Before hosp.	Time of hosp.		8 year course		8-23 years after hosp.	Re view										Interval between hospitalation and review (mean)
		Duration of the disease (mean)	Duration of disability (mean)	Frequency of recurrences	Impaired working capacity		Frequency of recurrences	Severity of trouble				Symptoms					
								Per cent	Months	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	
	No earlier symptoms	Per cent	Months	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Yrs.	
A	39.8	6.2	4.3	14.9	2.5	8.0	68.2	25.9	2.5	2.5	1.0	68.2	18.9	12.9		14.8	
B	19.4	8.1	4.8	19.4	11.1	—	25.0	58.3	16.7	—	—	25.0	50.0	25.0		13.3	
C	27.0	9.4	7.5	14.3	27.0	12.7	14.3	14.3	38.1	1.6	31.7	14.3	44.4	41.3		14.8	
Entire material	34.7	7.1	5.0	15.3	8.7	8.0	51.7	27.3	11.7	2.0	7.3	51.7	28.0	20.3		14.6	

VII. DISCUSSION

It is often difficult to draw direct parallels, and therefore to make any definite conclusions on the basis of comparisons of various series of human material. This surely applies to no less degree to the disease discussed. Those acquainted with disc surgery know, for example, that apparently similar protrusions compressing the same nerve root do not always produce the same symptoms or signs. The late results after freedom from acute symptoms are not similar — no matter whether this is achieved by conservative or surgical treatment. In the evaluation of the results achieved by a given type of treatment some other factors must also be taken into account. Differences in sex distribution, age distribution, occupational distribution, insufficient duration of the follow-up, for example, presumably also might influence the figures illustrating the conditions of the patients.

In the present material the sex and age distributions were roughly the same as those usually given in reports on surgically treated sciatica (page 37).

Of the males, 60 per cent were heavy workers. As to some of the females, it was impossible to state with certainty whether they should be classed as heavy workers or not.

Of importance in the evaluation of treatment is the duration of the follow-up. Sciatica often runs a remittent course and serious recurrences can occur after years of freedom from symptoms. This implies that a short follow-up is not sufficient for evaluating the late results. In the present material the interval between the time of hospitalisation and the review was long (8—23 years, average 14.5 years).

Below some problems bearing on the course of the disease are discussed against the background of the results set forth above.

Of the 300 patients, 41 per cent (124 patients) were completely symptom-free during the first 4-year period after hospitalisation. During the subsequent 4 years (8-year period) 111 of the 124 were still completely symptom-free, *i. e.*, 37 per cent of 300 patients. At the time of the review (8—23 years after hospitalisation) 101, *i. e.*, 34 per cent of 300 patients were still completely symptom-free (Table 19). No statistically significant difference was found between the males and females with regard to the frequency of complete freedom from symptoms or the severity of trouble (Diagram 6).

During the 8-year period after hospitalisation 67 per cent were "free from symptoms" (Diagram 18). Here those completely symptom-free and those with occasional mild trouble are taken together. The latter had such mild trouble that they were regarded as being practically symptom-free. Recurrences were noted in 30 cases of "the symptom-free" (Group A, 201 cases) but since the course of the disease was otherwise favourable these cases with recurrences were assigned to this group, because their allotment to any of the other groups (B and C) would not adequately reflect the otherwise favourable course in these cases.

Even when recurrences occurred among the symptom-free after the course of 8 years, the condition was otherwise on the whole unchanged and only a small percentage of those who had been symptom-free for 8 years experienced any deterioration later (Diagram 25).

The remaining third of the material had rather constant mild (Group B, 36 cases) and rather constant moderate or severe (Group C, 63 cases) trouble during the 8-year period after hospitalisation. Despite such prolonged trouble the prognosis for these cases was nevertheless not necessarily poor, because some of them were found to be symptom-free at the review. At that time, by when an average of 14.2 years had elapsed since hospitalisation of these 99 patients, 18 per cent were completely symptom-free.

As to the symptoms, sciatic symptoms were reported more frequently than only back symptoms during the first few years

after hospitalisation (Diagram 7). The radiating symptoms tended to disappear with time. They were practically always combined with back symptoms. The frequency of only back symptoms, on the other hand, persisted fairly steadily throughout the years after hospitalisation. As to back trouble in general, persistent after the acute stage or appearing later, it is, however, difficult to decide whether it, is necessarily related to the earlier lumbago-ischias or whether it might be of some other origin. It must be borne in mind that back pain is not uncommon even without preceding lumbago-ischias. This applies above all to heavy workers in the 40 to 60 year age class, where back trouble in connection with heavy work must be regarded as common. Thus at a review of a normal material consisting of 666 heavy workers in this age, HULT (1954) found some type of back trouble in about 70 per cent. Therefore, in the account of persistent back pain after sciatica, the figures are liable to be fictitiously high because of such factors so difficult to judge.

On comparison between heavy manual workers and the remainder (light/not manual workers) no statistically significant difference could be demonstrated regarding the severity of trouble or the nature of symptoms during the course after hospitalisation (Diagrams 8, 9 and 19). However, the heavy manual workers who became symptom-free, did so later than the light or not manual workers. Of those who were doing heavy manual work before hospitalisation most of them returned to the same type of work afterwards. One might expect a return to heavy work after sciatica would be decidedly unfavourable for these patients but analysis of the data in the present material provided no support for such an assumption. Nevertheless, during work sequelae of various types must involve greater inconvenience for heavy manual workers than for others.

Comparison between patients with "normal", "slightly changed" and "pronouncedly changed" back at time of the review. At the review the patients were classed according to the state of the back (page 49). A certain agreement was found

between the various types of backs and the patients' reports of trouble after hospitalisation until the time of the review. Those with a normal or slightly changed back were more frequently symptom-free than those with pronouncedly changed back. The last-mentioned category showed a higher frequency of only back symptoms than the others, while radiating symptoms showed no such definite difference of frequency (Diagrams 10, 11 and 20). The investigation thus produced evidence for the occurrence of a certain parallelism between the prolonged permanent or intermittent back trouble reported by the patients and deviations from a normal back.

A comparative investigation was made with respect to what extent the age of the patients at the initial onset might be of importance in the later course of sciatica. Comparisons were made between the later course of those patients who had the initial attack before the age of 30, between 30 and 40 and above 40 years. No differences were found during the first two 4-year periods or at the time of the review in the frequency of trouble or symptoms on comparison between these age classes (Diagrams 12 and 13, Table 29). The analysis referred to the time of hospitalisation, which, however, did not coincide with the initial onset for all 300 patients, 111 having had earlier sciatic symptoms.

The patients without previous attacks of sciatica (189) were divided in the same way in three age groups, but even then no statistically significant differences were found in the later course (Diagrams 16 and 17).

Judging by this analysis, the patient's age at onset of the disease had no definite effect on the prognosis. In the lowest age group, the heavy workers were over-represented (Table 22). Of all those with occasional mild trouble about one third had symptoms only in association with heavy work or the like (Table 21) but were otherwise free from trouble. This implies that if heavy manual workers with sciatica in young years are not completely symptom-free relatively soon, they should not continue with such work but preferably take up a lighter occupation.

On comparison of earlier completely symptom-free patients with those who had had trouble earlier, freedom from symptoms during the 8-year period after hospitalisation and at the time of the review was found to be more common among those who had earlier been symptom-free (Diagrams 14, 15 and 21). The latter had been admitted to one of the departments because of the initial attack of sciatica, and it therefore appears probable that the earlier care with bed-rest in hospital contributed to the higher frequency of freedom from symptoms among these patients in the later course. It should, however, be mentioned that the frequency of recurrence after hospitalisation was equally high in both groups.

A comparison was also made between the earlier completely symptom-free patients distributed among three different groups with respect to the duration of hospitalisation (up to 4, 4 to 8 and 8 months and more). This can be regarded as an indirect expression of the severity of the symptoms of the disease at the time under consideration and thus give prognostic information. One might thus ask whether those with particularly prolonged symptoms during the initial attack of lumbago-ischias must expect a much more unfavourable later course than those in whom the initial onset was relatively mild. No such evidence was found in respect to the severity and nature of the trouble in the later course (Tables 25, 26 and 28).

Comparison of cases with indications for operation and cases without indications for operation. — It was considered of special interest to compare the prognosis of cases with specially serious and prolonged symptoms (cases with indications for operation) with those with milder symptoms and course at the time of hospitalisation. Definitions and the size of the two groups are given on page 90.

Both freedom from symptoms and different degrees of trouble were noted with the same frequency during the 8-year course after hospitalisation, while persistent sciatic symptoms were found with somewhat higher frequency among those with indications for operation (Diagram 22). At the time of the review no definite differences in any respect were found (Dia-

grams 23 and 24). The frequency of recurrences was also the same in both groups. On the other hand, those with indications for operation had more prolonged trouble after hospitalisation with a consequently somewhat longer total duration of the disease and disability (Table 30). Permanently decreased working capacity was also noted somewhat more often among the latter. These observations suggest that in cases with indications for operation, thus in cases with particularly serious and prolonged symptoms, a less favourable later course must be expected.

Studies in the *frequency of recurrences* from the initial onset of the disease as well as only after hospitalisation (conservative treatment in hospital) were made from various points of view (Tables 18, 25, 34, 35 and 36). It was found among other things that the frequency of recurrence from the initial onset of the disease until the time of the review was as high as 40 per cent. However, this need not reasonably imply that this figure is representative for conservatively treated series, since the frequency of recurrence after hospital care in the departments was lower, namely 21 per cent. The rest of the recurrences thus occurred before hospitalisation (earlier attacks) and then many of the patients had obviously not received adequate treatment.

The frequency of recurrences was highest during the first 5 years after the onset of lumbago-ischias but also after more than 10 years' freedom of symptoms recurrences were noted.

The investigation also showed that sex, age at initial onset, type of work or occupation or other factors studied had no appreciable influence on the frequency of recurrences.

Of social medical importance is what the disease under consideration implied with regard to *total periods of hospital care, of the disease and of disability*. The definitions of these terms as used here are given on page 106.

For 40 per cent the *total periods of hospital care* were 1 to 2 months. In 21 cases they were as long as 5 to 26 months. The average period in hospital was about 2.1 months (Table 38).

It is difficult to give *the total periods of the disease* with any degree of accuracy because the figures were often based entirely on information given by the patients. A period of more than 6 months was reported by about 50 per cent. The mean duration of the disease was 10.4 months (Table 39).

The total periods of disability lasted for more than 6 months in almost half of the 300 cases with an average of 7.2 months per patient (Table 40).

SUMMARY

The purpose of the investigation was to form an opinion of the course of conservatively treated sciatica. The material consisted of 310 cases (205 males and 105 females), treated between 1930 and 1945 at the departments of medicine and orthopedics in Lund and Malmö. All of the patients had neurologic signs at the time of hospitalisation. Treatment was in principle uniform, *i. e.*, bed-rest and physical therapy. The subjects were reviewed during the years 1953—1954, all except 4 by the writer personally. The interval between hospitalisation and review was 8—23 years (average 14.5 years).

At the review the course of the disease from initial onset was analysed. The severity and nature of the trouble during the interval between hospitalisation and review was carefully investigated and the data obtained are accounted for during different periods. In addition, a special account is given of the more uniform course of the disease during the first 8 years after hospitalisation.

Since 10 patients were operated on after 1945 because of recurrences of the disease, the figures given below refer to 300 patients. Of these 300 patients, 189 had not had sciatic symptoms and 104 of these 189 had been completely symptom-free before the time of hospitalisation. Of the 111 with sciatic symptoms earlier, 70 per cent had had proper attacks of sciatica (lumbago-ischias), while the remainder had had only mild and relatively transient sciatic symptoms. The analysis may be summarised as follows:

Complete freedom from symptoms during the first 8 years after hospitalisation was noted in 37 per cent and during the interval between hospitalisation and review in 34 per cent.

Occasional mild trouble during the 8-year period was reported by 20 per cent, usually of the type mild *insufficiencia dorsi* and

often reported as occurring only in association with heavy work or on exposure to cold.

Rather constant trouble of varying severity with or without recurrences was recorded in 33 per cent.

The remaining 10 per cent were patients with recurrences during the 8-year period, but otherwise completely symptom-free or with occasional mild trouble.

The course from the end of the 8-year period until the review varied widely for those not completely free from symptoms (63 per cent). As to those with rather constant trouble (99 patients), improvement to complete freedom from symptoms sometimes occurred despite long duration of the trouble. At the time of review this was noted in 18 per cent (time of review is to be understood as the period during the last 2 years before the re-examination).

At the time of review, 52 per cent of the entire material were completely free from symptoms and 27 per cent had occasional mild trouble, in other words, 79 per cent had no or at most slight trouble, which, however, does not imply that the entire course after hospitalisation was so favourable.

As to different symptoms, sciatic symptoms were reported with a higher frequency than only back symptoms during the first 4 years after the hospitalisation. The frequency of sciatic symptoms decreased with time. Usually sciatic symptoms were accompanied by back symptoms. The frequency of only back symptoms, however, was fairly steady throughout the period of the investigation.

Of those who were not completely symptom-free at the time of the review (48 per cent), 28 per cent had only back symptoms, 16 per cent both back and sciatic symptoms, and only 4 per cent had only sciatic symptoms.

Comparison of the material divided into various groups showed:

no differences in the later course

between heavy manual workers (134) and light/not manual workers (166);

between patients who at the time of initial onset of sciatica were below 30 years (80), 30 to 40 years (121), and above 40 years (99);

differences in the later course

between those who at the review showed a normal (104), a slightly changed (116) and a pronouncedly changed (79) back. Complete freedom from symptoms was less common and the frequency of only back symptoms higher among those with a pronouncedly changed back;

between those who were completely symptom-free before hospitalisation (104) and the remainder (196). During the 8-year period and up to the time of the review the former were completely symptom-free in higher frequency;

between cases "with indications for operation" (96) and those "without" (132). The frequency of sciatic symptoms during the 8-year period was somewhat higher for the former, but no difference was found as to the severity and nature of trouble at the time of the review. From the time of hospitalisation, the total periods of hospital care and disability were longer, and the frequency of permanently decreased working capacity higher, among the former.

In 40 per cent recurrences occurred between the initial attack of sciatica (lumbago-ischias) and the time of the review. After the time of hospitalisation the frequency of recurrences was about 21 per cent.

Recurrences were most common within the first 5 years of the initial onset of lumbago-ischias.

The frequency of recurrences after hospitalisation proved independent of sex, age at initial onset, occupation or other factors studied.

In the present material the total periods of hospital care as from initial onset of the disease up to the review were on the average 2.1 months. The total periods of the disease and of disability were 10.4 months and 7.2 months, respectively.

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REFERENCES

- ADSON, A. W. & OTT, W. O.: Results of the removal of tumors of the spinal cord. *Arch. Neurol. & Psychiat.* 1922, 8: 520.
- AITKEN, A. P. & BRADFORD, C. H.: End results of ruptured intervertebral discs in industry. *Am. J. Surg.* 1947, 73: 365.
- ANTONI, N.: Ett fall av kronisk rotkompression med ovanlig orsak, hernia nuclei pulposi disci intervertebralis. *Svenska läk.-tidning.* 1931, 28: 436.
- BADGLEY, C. E.: The articular facets in relation to low-back pain and sciatic radiation. *J. Bone & Joint Surg.* 1941, 23: 481.
- BARR, J. S.: Low-back and sciatic pain. Results of treatment. *J. Bone & Joint Surg.* 1951, 33-A: 633.
- Ruptured intervertebral disc and sciatic pain. *J. Bone & Joint Surg.* 1947, 29: 429.
- BAUER, G. & HELLSTEN, W.: Sympaticusblockad som hjälpmedel vid behandlingen av lumbago-ischias. *Nord. Med.* 1941, 9: 601.
- BERGSMAN, A., VON REIS, G. & SAHLGREN, E.: Diagnosis and treatment of sciatica based on a follow-up study. *Acta med. Scandinav.* 1952, 144: 71.
- BOYSEN, G.: Sciatica, especially the prognosis by conservative treatment. *Acta med. Scandinav.* 1947, 128: 473.
- BRADFORD, F. K. & SPURLING, R. G.: The intervertebral disc with special reference to rupture of the annulus fibrosus with herniation of the nucleus pulposus. Springfield 1947.
- BRAHME, L.: A contribution to the knowledge of the prognosis of ischias. *Acta med. Scandinav.* 1942, 110: 1.
- CATHELIN, M. F.: Une nouvelle voie d'injection rachidienne. Méthode des injections épidurales par le procédé du canal sacré. Applications à l'homme. *Compt. rend. Soc. biol.* 1901, 53: 452.
- COLONNA, P. C. & FRIEDENBERG, Z. B.: The disc syndrome. Results of the conservative care of patients with positive myelograms. *J. Bone & Joint Surg.* 1949, 31-A: 614.
- COPLANS, C. W.: Lumbar intervertebral disc herniation. A method of conservative treatment. *South African M. J.* 1953, 27: 182.
- COTUNNII, D.: De ischiade nervosa commentarius. Viennae 1770 (1764). (Cit. Norlén.)
- CRAIG, W. MCK. & GHORMLEY, R. K.: The significance and treatment of sciatic pain. *J. A. M. A.* 1933, 100: 1143.
- CRISP, E. J.: The treatment of lumbar disc lesions by immobilization in a plaster jacket. *Rheumatism* 1948, 4: 211.

- DANDY, W. E.: Concealed ruptured intervertebral disks. A plea for the elimination of contrast mediums in diagnosis. *J. A. M. A.* 1941, 117: 821.
- Loose cartilage from intervertebral disk simulating tumor of the spinal cord. *Arch. Surg.* 1929, 19: 660.
- DANFORTH, M. S. & WILSON, P. D.: The anatomy of the lumbosacral region in relation to sciatic pain. *J. Bone & Joint Surg.* 1925, 23: 109.
- DEJERINE, J. & REGNARD, M.: Sciatique radiculaire avec paralysie dissociée des muscles antéro-externes de la jambe droite. Intégrité du jambier antérieur. Anesthésie dans le territoire de S-1. *Rev. neurol.* 1912, 23: 288.
- DUNNING, H. S.: Prognosis in so-called sciatic neuritis. *Arch. Neurol. & Psychiat.* 1946, 55: 573.
- DURBIN, F. C.: The conservative treatment of sciatic pain by immobilisation in a plaster jacket. *J. Bone & Joint Surg.* 1948, 30-B: 487.
- EKVALL, S.: Enquête clinique, au printemps de 1938, sur les cas de sciatique observés durant les années 1933 et 1934. *Acta med. Scandinav.* 1939, 101: 1.
- ELLSBERG, C. A.: The extradural ventral chondromas (ecchondroses), their favorite sites, the spinal cord and root symptoms they produce, and their surgical treatment. *Bull. Neurol. Inst., New York*, 1931, 1: 350.
- FALCONER, M. A., MCGEORGE, M. & BEGG, A. C.: Observations on the cause and mechanism of symptom-production in sciatica and low-back pain. *J. Neurol., Neurosurg. & Psychiat.* 1948, 11: 13.
- Surgery of lumbar intervertebral disk protrusion. A study of principles and results based upon one hundred consecutive cases submitted to operation. *Brit. J. Surg.* 1948, 35: 225.
- FEILING, A.: Sciatica: Its varieties and treatment. *Brit. M. J.* 1928, 1: 386.
- FRANCILLON, M. R.: Au sujet du traitement conservateur des hernies discales. *Helvet. chir. acta* 1950, 17: 355.
- FREIBERG, A. H. & VINKE, T. H.: Sciatica and the sacro-iliac joint. *J. Bone & Joint Surg.* 1934, 16: 126.
- FREIBERG, S.: Low back and sciatic pain caused by intervertebral disc herniation. Anatomic and clinical investigations. *Acta chir. Scandinav.* 1941, 85, Suppl. 64.
- Sobre el tratamiento de los prolapsos discales lumbares. Algunos puntos de vista basados en 700 casos operados. *Día méd.* 1946, 18: 1785.
- GILL, G. G., MANNING, J. G. & WHITE, H. L.: Surgical treatment of spondylolisthesis without spine fusion. *J. Bone & Joint Surg.* 1955, 37-A: 493.
- GIULIANI, K.: Die konservative Behandlung des Bandscheibenprolapses. Beilageheft *Ztschr. Orthop.* 1954, 84: 105.
- Konservative Behandlung der Bandscheibenschäden (Indikationen, Methoden, Früh- und Spätergebnisse, Beobachtungen von Schäden bzw. Rezidiven nach Operationen). *Arch. klin. Chir.* 1951, 267: 113.
- GOLDTHWAIT, J. E.: The lumbo-sacral articulation. An explanation of many

- cases of "lumbago", "sciatica" and paraplegia. Boston M. & S. J. 1911, 164: 365.
- GOLDTHWAIT, J. E. & OSGOOD, R. B.: A consideration of the pelvis articulations from an anatomical, pathological and clinical standpoint. Boston M. & S. J. 1905, 152: 593, 634.
- GRANTHAM, E. G. & SPURLING, R. G.: Ruptured lumbar intervertebral disks. M. Clin. North America 1953, 37: 479.
- GRILL, W.: Die Pathologie des Ligamentum flavum in ihrer klinischen Bedeutung. Med. Monatsschr. 1950, 4: 914.
- HAGGART, G. E.: Sciatic pain of unknown origin. An effective method of treatment. J. Bone & Joint Surg. 1938, 20: 851.
- HARDT: Ergebnisse der konservativen Ischiasbehandlung. Beilageheft Ztschr. Orthop. 1954, 84: 118.
- HELLWEG, J.: Ischias, en klinisk studie. Köpenhamn 1920.
- HENDERSON, R. S.: The treatment of lumbar intervertebral disk protrusion. An assessment of conservative measures. Brit. M. J. 1952, 2: 597.
- HERTZLER, A. E.: The nature and treatment of sciatica. Am. J. Surg. 1926, 41: 200.
- HEÜMAN, G.: Än en gång sjukdomar i ryggraden såsom orsak till lumbago och ischias. Svenska läk.-tidning. 1920, 17: 457.
- HULT, L.: Cervical, dorsal and lumbar spinal syndromes. A field investigation of a non-selected material of 1200 workers in different occupations with special reference to disc degeneration and so-called muscular rheumatism. Acta orthop. Scandinav. 1954, Suppl. 17.
- IDELBERGER, K.: Beitrag zur Diagnose und orthopädischen Behandlung des Bandscheibenprolapses. Arch. klin. Chir. 1949, 263: 180.
- INGVAR, S.: On the nature of myalgia. Acta rheumatol. 1936, 8: 30.
- INMAN, V. T. & SAUNDERS, J. B. de C. M.: Referred pain from skeletal structures. J. Nerv. & Ment. Dis. 1944, 99: 660.
- JANSEN, H.: Om ischias, særlig dens ætiologi, patogenese og terapi, belyst ved 200 tilfælde. Bibl. læger 1926, 118: 343.
- KEEGAN, J. J.: Diagnosis of herniation of lumbar intervertebral disks by neurologic signs. J. A. M. A. 1944, 126: 868.
- KEHRER, H. & KRISCHEK, J.: Vergleichende Betrachtung der Erfolge bei konservativer und operativer Behandlung der Ischias. Neue med. Welt 1950, 1: 1010.
- KELLEY, J. H., VORIS, D. C., SVIEN, H. J. & GHORMLEY, R. K.: Multiple operations for protruded lumbar intervertebral disk. Proc. Staff Meet., Mayo Clin. 1954, 29: 546.
- KIRSTEIN, L.: An after-examination of operated and non-operated cases with "clinical symptoms of herniated disc". Acta med. Scandinav. 1945, 120: 93.
- KOCHER, T.: Die Verletzungen der Wirbelsäule zugleich als Beitrag zur

- Physiologie des menschlichen Rückenmarks. Mitt. a. d. Grenzgeb. d. Med. u. Chir. 1896, 1: 415.
- KORHONEN, A. & NUMMI, P.: Symptoms and late results in operated and unoperated cases of lumbar disc herniation. *Duodecim* 1952, 68: 328.
- KUHNS, J. G.: Conservative treatment of sciatic pain in low-back disability. *J. Bone & Joint Surg.* 1941, 23: 435.
- KÖNIG, W.: Operative oder konservative Behandlung der Ischias. *Med. Clin.* 1950, 45: 334.
- LASÈGUE, C.: Considérations sur la sciatique. *Arch. gén. de méd.* 1864, 2: 558.
- LINDBLOM, K. & REXED, B.: Spinal nerve injury in dorso-lateral protrusions of lumbar disks. *J. Neurosurg.* 1948, 5: 413.
- LINDGREN, S.: Some problems concerning the herniated intervertebral disk from a clinical point of view. *Acta Chir. Scandinav.* 1949, 98: 295.
- LINDESTEDT, F.: Das Wesen der Myalgie. *Acta rheumatol.* 1936, 8: 37.
- Über die Ätiologie und Pathogenese der Ischias und Lumbago nebst einer neuen Anschauungsweise dieser Neuralgien. *Ztschr. klin. Med.* 1922, 93: 179.
- LORTAT-JACOB, L. & SABARÉANU, G.: Sciatique radiculaire unilatérale. *Presse méd.* 1904, 2: 633.
- LOVE, J. G.: The disc factor in low-back pain with or without sciatica. *J. Bone & Joint Surg.* 1947, 29: 438.
- & WALSH, M. N.: Intraspinal protrusion of intervertebral disks. *Arch. Surg.* 1940, 40: 454.
- VON LUSCHKA, H.: Die Halbgelenke des menschlichen Körpers. Berlin 1858.
- MAGNUSON, P. B.: Differential diagnosis of causes of pain in the lower back accompanied by sciatic pain. *Ann. Surg.* 1944, 119: 878.
- MALMROS, R.: Den lumbale discusprolaps og ligamentære rodcompression. En undersøgelse af ætiologi, klinik og behandling paa grundlag af 115 tilfælde. København 1942.
- MENSOR, M. C.: Non-operative treatment, including manipulation, for lumbar intervertebral disc syndrome. *J. Bone & Joint Surg.* 1955, 37-A: 925.
- MEYERDING, H. W.: Low backache and sciatic pain associated with spondylolisthesis and protruded intervertebral disc: incidence, significance, and treatment. *J. Bone & Joint Surg.* 1941, 23: 461.
- MIDDLETON, G. S. & TEACHER, J. H.: Injury of the spinal cord due to rupture of an intervertebral disc during muscular effort. *Glasgow M. J.* 1911, 76: 1.
- MILLIKAN, C. H.: Sciatica, differential diagnosis and treatment. *J. A. M. A.* 1951, 145: 1.
- The problem of evaluating treatment of protruded lumbar intervertebral disk. Observations of results of conservative and surgical treatment in 429 cases. *J. A. M. A.* 1954, 155: 1141.

- MIXTER, W. J. & BARR, J. S.: Rupture of the intervertebral disc with involvement of the spinal canal. *New England J. Med.* 1934, 211: 210.
- OBER, F. R.: The rôle of the iliotibial band and fascia lata as a factor in the causation of low-back disabilities and sciatica. *J. Bone & Joint Surg.* 1936, 18: 105.
- O'CONNELL, J. E. A.: The indications for and results of the excision of lumbar intervertebral disc protrusions: a review of 500 cases. *Ann. Roy. Coll. Surgeons England* 1950, 6: 403.
- PENDL, F.: Die präsakrale Injektion bei der Ischias. (Vorläufige Mitteilung). *Zentralbl. Chir.* 1934, 61: 2139.
- PETRÉN, K.: Några erfarenheter om ischias och malum coxae senile samt deras behandling. *Nord. tidsskr. f. terapi* 1908, 7: 3, 33.
- PETTE, H. & BECKER, P. E.: Zur Symptomatologie und Pathogenese der Neuritis lumbosacralis. *Deutsche Ztschr. Nervenhe.* 1938, 147: 1.
- PILLOKAT, A.: Die Ultraschall-Behandlung des Bandscheibenvorfalles im Bereich der Lendenwirbelsäule. *Deutsches Gesundheitswesen* 1951, 6: 1194.
- PUTTI, V.: On new conceptions in the pathogenesis of sciatic pain. *Lancet* 1927, 2: 53.
- ROBINSON, D. R.: Pyriformis syndrome in relation to sciatic pain. *Am. J. Surg.* 1947, 73: 355.
- VON ROSEN, S.: Några ortopediska synpunkter på ischiasproblemet. *Svenska läk.-tidning.* 1944, 41: 645.
- RÖVIG, G.: Rupture of lumbar discs with intraspinal protrusion of the nucleus pulposus. A clinical study. *Acta chir. Scandinav.* 1949, suppl. 144.
- SAHLGREN, E.: Beror ischias alltid på lokal affektion av rot eller nerv? En undersökning med särskild hänsyn tagen till diskbrockets betydelse. *Svenska läk.-tidning.* 1942, 39: 1137.
- SCHMORL, G.: Über Knorpelknoten an der Hinterfläche der Wirbelbandscheiben. *Fortschr. Röntgenstr.* 1929, 40: 629.
- Über die an den Wirbelbandscheiben vorkommenden Ausdehnungs- und Zerreibungsvorgänge und die dadurch an ihnen und der Wirbelspongiosa hervorgerufenen Veränderungen. *Verhandl. d. deutsch. path. Gesellsch.* 1927, 22: 250.
- SCHÖBER, P.: Kritische Betrachtungen über das Lasèguesche Zeichen und die sogenannte Ischias. *Deutsche med. Wchnschr.* 1940, 66: 1269.
- SENNING, Å. & SJÖQVIST, O.: Senresultaten vid diskbräck. En efterundersökning av 400 opererade fall. *Nord. Med.* 1947, 34: 1128.
- SHINNERS, B. M. & HAMBY, W. B.: Protruded lumbar intervertebral discs: results following surgical and non-surgical therapy. *J. Neurosurg.* 1949, 6: 450.
- SICARD, M. A.: Les injections médicamenteuses extradurales par voie sacro-coccygienne. *Compt. rend. Soc. biol.* 1901, 53: 396.
- Névrodocytes et funiculites vertébrales. *Presse méd.* 1918, 26: 9.

- SMITH-PETERSEN, M. N. & ROGERS, W. A.: End-result study of arthrodesis of the sacro-iliac joint for arthritis — traumatic and non-traumatic. *J. Bone & Joint Surg.* 1926, 24: 118.
- STEINDLER, A.: An analysis and differentiation of lowback pain in relation to the disc factor. *J. Bone & Joint Surg.* 1947, 29: 455.
- STENDER, A.: Treatment of sciatica (including that caused from herniated discs) by presacral injection of novocaine. *J. Neuropath. & Clin. Neurol.* 1951, 1: 301.
- STENSTRÖM, T.: Eine klinische Studie über "Neuritis"-Symptome bei Ischias. *Acta psychiat- et neurol.* 1931, 6: 593.
- STODDARD, A.: Manipulative procedures in the treatment of intervertebral disc lesions. *Brit. J. Phys. Med.* 1951, 14: 101.
- SYMONDS, C.: Symptomatology and treatment of displaced intravertebral discs. *Tr. M. Soc. London* 1949, 65: 23.
- SÖDERBERG, L.: Olika smärttillstånd vid lumbago-ischias i belysning av nyare kunskaper om disk- och nervrotförändringar. *Nord. med.* 1955, 53: 673.
- & ANDRÉN, L.: Disc degeneration and lumbago-ischias. *Acta orthop. Scandinav.* 1955, 25: 137.
- VALLEIX, F. L. I.: *Traité des névralgies ou affections douloureuses des nerfs.* Paris 1841.
- WALCHEF, L. S.: The traction brace. A new traction method in the conservative treatment of intervertebral disc lesions. *Surgery* 1954, 35: 758.
- WARIS, W.: Lumbar disc herniation. Clinical studies and late results of 374 cases of sciatica operated on the diagnosis or suspicion of lumbar disc herniation. Helsinki 1948. Also published in *Acta chir. Scandinav.* 1949, Suppl. 140.
- VAN WENT, J. M.: Prolapse of intervertebral discs treated with ultrasonic waves. *Brit. J. Phys. Med.* 1952, 15: 120.
- YEOMAN, W.: The relation of arthritis of the sacro-iliac joint to sciatica, with an analysis of 100 cases. *Lancet* 1928, 2: 1119.
- YOUNG, R. H.: Protrusion of intervertebral discs. *Proc. Roy. Soc. Med.* 1947, 40: 233.
- YTREHUS, Ö.: Prognosis in medically treated sciatica. (A follow-up investigation of 256 patients.) *Acta med. Scandinav.* 1947, 128: 452.
- ÖSTBERG, O.: Some aspects of the treatment of sciatica. *Acta med. Scandinav.* 1950, Suppl. 246.