

# The Classic

## Exposure of Ruptured Lumbar Discs

### A Technical Discussion

PROFESSOR CARL HIRSCH\*

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Carl Hirsch was born in Stockholm in 1913 and died on June 19, 1973. Dr. Hirsch studied medicine at the Karolinska Institut in Stockholm, where in 1944 he received the degree of Medical Doctor of Science. In 1955 he became head of the Department of Orthopaedics at the University in Uppsala, and in 1957 he was appointed Professor of Orthopaedics. In 1960 he was appointed Professor of Orthopaedic Surgery at the University of Gothenburg, where he was head of the department, and on July 1, 1969, he returned to Stockholm as Professor at the Karolinska Institut.

In 1946 Carl Hirsch served under Professor Langenskiöld in Helsinki; in 1948 he studied orthopaedics under Professors Herbert Seddon and Joseph Trueta in Oxford, and later in 1948 with Professor Joseph Barr in Boston. Hirsch was a member of the Société Internationale de Chirurgie Orthopédique et de Traumatologie, Société Internationale de Chirurgie, International College of Surgeons, honorary member of the American Academy of Orthopaedic Surgeons, honorary member of the Shriners in the U.S.A., honorary member of the Israel Orthopaedic Association, and a member of the British Orthopaedic Association and the Swiss Orthopaedic Association. In 1966 he received the Steindler Award. He was made an honorary member of the Société Française de Chirurgie Orthopédique in 1968, and *Doctor Honoris Causa* at the University of Guildford, London, in 1968. From 1963 to 1966 he was President of the Scandinavian Orthopaedic Association, and in 1966 he became Chairman of the Swedish Orthopaedic Association.

His scientific publications number more than 200, and deal with the pathomorphology and biomechanics of bone, joints and spine, especially the hip joint and the lumbar spine. For over 20 years he supervised a biomechanics laboratory from which 18 monographs have been published in the form of theses of medical doctorates of science. Investigators and scientists from many different countries came to work under the guidance of Carl Hirsch.

VICTOR H. FRANKEL

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The results of surgery for ruptured intervertebral discs are discussed with regard to recurrences, residual backache, convalescent time and ability to maintain activity. In many centers it is considered that surgery can offer better results if the interspace involved is fused.

In Sweden fusion has not become a popular "combined" intervention. Most disks were and are removed without osteosynthesis. It is strongly felt that the results in true herniated disks are not influenced by fusion.

Because of this attitude, the significance of the exposure on the end-results has drawn more and more attention. Laminectomy, hemilaminectomy, and partial hemilaminectomy represent a trend to limit removal of bony material. It has been noticed that the

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\* Former head of the Orthopaedic Department, University of Uppsala, Sweden.

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FIG. 1. Carl Hirsch, 1913–1973.

soft-tissue part of the surgery can offer a better recovery if the approach: (1) can avoid damage to important functional elements; and (2) if bleeding is kept under control, eliminating or decreasing postoperative hematoma.

It is felt that the postoperative stay in bed can be decreased without discomfort. In the author's department the stay in bed is limited to one day and the stay in hospital to four days. Most patients are back at work after one month. Neither postoperative physiotherapy nor back supports are offered. It is felt that the procedure used is advantageous. This report aims to explain some of the technical problems which may improve the immediate and the later results.

#### ANAESTHESIA UNDER CONTROLLED HYPOTENSION

In the past different methods of analgesia have been tried. Earlier, the exposure was done under local anaesthesia. Since the in-

volved root was painful, the operator was directed to the ruptured area by the patient. In those days myelography was not a routine preoperative investigation, and our clinical knowledge was poor. In a recent report the author has presented a clinical evaluation of sciatica, and based on our experience today, local anaesthesia is no longer of basic importance. If the myelogram is negative, at least two interspaces must be explored.

The choice is now between spinal or general anaesthesia combined with local. The infiltration of 0.5% novocain with adrenalin injected externally to the arches, and the ligamentum flavum is justified to limit the bleeding. Adrenalin can also be administered in a normal saline solution. The disadvantage of this technique is that it is effective only during the operation. A couple of hours later, uncontrolled bleeding starts, giving rise to large haematomas, which infiltrate muscles and the extradural space. Even if the haematoma can be partly evacuated by temporary drainage, it is a factor that gives undesirable scars which may affect the immediate as well as the late result. General anaesthesia (pentothal + N<sub>2</sub>O) under controlled hypotension offers many advantages.

(The anaesthetic procedure will be presented separately.)

During the operation the anaesthetist keeps the blood pressure at a suitable level in order to eliminate the bleeding, not only when the muscle attachments are loosened, but also from the injured arches when the bony resection is made. Most important is the "dryness" while the root is manipulated and the disc removed. If hypotension adds an enjoyable atmosphere while surgery is in progress, its most important value appears during the postoperative care. There is almost no bleeding at all visible on the dressing and the general condition of the patient is good. So far no complications have been observed. No postoperative bleeding has occurred. It seems as if adequate blood clotting takes place while hypotension is in progress.

(The haemodynamic explanation is given in a separate paper by our anaesthetist.)

## SURGICAL APPROACH

The patient is placed either in the prone or lateral position. The latter is preferred by many because it causes less circulatory stasis and makes it easier for the anaesthetist to administer the anaesthetics. The prone position offers a better view, and many agree that the manual work is made easier. The pressure on the abdomen and chest affecting ventilation is mostly overcome by frames of various types. The flexed spine is helpful in bringing the spinous processes and arches apart. A good position is obtained if the iliac crest is supported by the frame and the hips are flexed with the knees straight. A flexible operating table is necessary.

Most surgeons accept a skin incision in the midline or close to the spinous processes. The fascia is cut longitudinally and usually close to the processes. Many accept exposure only on the affected side, and if so, the fascia is less tight if divided 1–2 cm laterally and parallel to the spinous processes. With an osteotome the muscles are temporarily removed from the processes and arches.

The fifth lumbar arch has a sharp edge caudally which makes orientation easier. If the anatomy is atypical, the lowest mobile spinous process is considered as the lumbosacral junction. This junction must be evaluated with regard to an AP roentgenogram since the fifth lumbar vertebra is not always the lumbosacral one. If the L<sub>5</sub> vertebra is more or less incorporated with the sacrum, the vertebra is not mobile and that interspace never has a prolapse. The root is usually found under the ligamentum flavum. That means that the yellow ligament must be removed as completely as possible in order to give the best view. Very often the ligament has two layers which are attached to the inner side of the arches, about 2–3 mm on each. If the arches are chiseled off with a fine chisel, the bone and the flavum can

be removed in one piece by blunt dissection or by curved sharp dissectors.

In ruptured discs where the root is affected, the epidural fat has disappeared or has been transformed into connective tissue, more or less dense.

There is a controversy about how much of the disc should be removed. While some surgeons limit their intervention to removal of "only" the prolapse, more and more try to evacuate as much as possible of the disc itself. The author removes as much as can be taken out first by a chondrotome than by curettage, trying to enter into the vertebral bodies. Since the cartilaginous plates and the remnants of the nucleus do not offer a base for a dense replacing scar important for a "healing" disc wound, the perforation into the vertebral body is considered valuable, even if this so far is purely theoretical. Earlier, the vertebra offered undesirable bleeding. With hypotension this is probably controlled. Intercorporeal bony fusion has not been considered necessary.

If a prolapse is not found in spite of exposure of several interspaces, no incision is made in the disc. The disc is thoroughly examined. Ruptures into which blunt instruments can enter are considered potential prolapses and those discs are evacuated. It is the author's definite opinion that diffusely bulging discs without prolapses and with mobile roots should not be evacuated since evacuation usually offers bad immediate and end results.

The closure of the wound is performed with the spine flexed. If the fascia is sutured with the spine straight, the spine will become tight and the patient will be unable to bend forward for many months. The tightness will be more pronounced and the back more rigid if the fascia is bound to the spinous processes. By making the fascial incision lateral to the processes and by suturing the layers while the spine is flexed, the back will be quite mobile the next day. It will be less painful and the mechanical stress on the wound will be decreased. This is comparable

to the usual procedure in knee joint surgery where the wound is closed with the knee flexed.

After surgery the patient is placed in bed on his back. When the patient is uncomfortable, the lateral position is accepted usually after five to eight hours.

The patient is allowed to leave bed the next day. Standing and weight-bearing do not produce such a pressure that disc material will squeeze out through the disc incision. Experiments on autopsy material have convinced us that extensive removal of disc material is a protection against further protrusions. If a small part of a prolapsed disc is removed the risk of further protrusion may be bigger.

After four days the patient is allowed to leave the hospital. He is back on the tenth day to have the stitches removed. He is then given a month to recover before he is told to go back to heavy work. Of course the convalescent time may vary depending on social

factors, but the patient is told that the operated disc can stand even high stresses.

### SUMMARY

Technical problems in disc surgery are discussed. Hypotension keeps bleeding under control while surgery is in progress and offers a good view of the exposed area.

Hypotension protects against postoperative haematoma.

The approach must limit damage to important functional elements.

By making the incision in the dorsal fascia lateral to the spinous processes and closing the wound with the spine flexed, postoperative tightness is less pronounced.

Extensive disc removal protects against disc material being squeezed out when early weightbearing is permitted.

The patient is allowed to leave bed the day after surgery.

No physiotherapy, no support, no fusion are needed.