

Wenner-Gren Center International Symposium Series
Volume 19



Cervical Pain

**Proceedings of the International
Symposium held in Wenner-Gren
Center, Stockholm, January 1971**

**Edited by
C. Hirsch and
Y. Zotterman**

Pergamon Press

CERVICAL PAIN

*Proceedings of the International Symposium
held in Wenner-Gren Center, Stockholm,
January 25-27, 1971*

Edited by

CARL HIRSCH and YNGVE ZOTTERMAN

Sponsored by

THE SWEDISH MEDICAL RESEARCH COUNCIL

THE WENNER-GREN CENTER FOUNDATION

KAROLINSKA INSTITUTET

THE FOLKSAM INSURANCE COMPANY

THE COMMITTEE FOR CO-OPERATION BETWEEN
THE SWEDISH RESEARCH COUNCILS AND THE WENNER-GREN
CENTER FOUNDATION



PERGAMON PRESS

Oxford · New York · Toronto

Sydney · Braunschweig

Pergamon Press Ltd., Headington Hill Hall, Oxford
Pergamon Press Inc., Maxwell House, Fairview Park, Elmsford,
New York 10523
Pergamon of Canada Ltd., 207 Queen's Quay West, Toronto 1
Pergamon Press (Aust.) Pty. Ltd., 19a Boundary Street,
Rushcutters Bay, N.S.W. 2011, Australia
Vieweg & Sohn GmbH, Burgplatz 1, Braunschweig

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First edition 1972

Library of Congress Catalog Card No. 72-82728

LIST OF PARTICIPANTS

PROFESSOR DENISE ALBE-FESSARD

Université de Paris
Faculté des Sciences
4, Av. Gordon-Bennet
Paris 16e, France

PROFESSOR BERTIL ALDMAN

Utflyktsvägen 36
161 51 Bromma

PROFESSOR EINAR BOHM

Akademiska Sjukhuset
Fack
750 14 Uppsala

DOC. JÖRGEN BOIVIE

Karolinska Inst
104 01 Stockholm

PROFESSOR V. FRANKEL

University Hospital
2065 Adelbert Road
Cleveland, Ohio 44106, U.S.A.

DOCENT RAGNAR FRYKHOLM

Södersjukhuset
Fack
100 64 Stockholm

DR GEORGE GORDON

University Laboratory of Physiology
2 Parks Road
Oxford, England

DOC K-E HAGBARTH

Akademiska Sjukhuset
Fack
750 14 Uppsala

MED. LIC. ROLF HALLIN

Akademiska Sjukhuset
750 14 Uppsala

PROFESSOR C. HIRSCH

Norrbackainstitutet
Box 6403
113 82 Stockholm

PROFESSOR HERBERT HENSEL

Physiologisches Institut der Universität
355 Marburg an der Lahn
Deutschhausstrasse 2
Germany

PROFESSOR LENNART HULT

Södersjukhuset
Fack
100 64 Stockholm

PROFESSOR AINSLEY IGGO

University of Edinburgh
Dept of Veterinary Physiology
Summerhall
Edinburgh 9, Scotland

PROFESSOR RUTH JACKSON

The Jackson Clinic
Dept of Orthopaedic Surgery
3629 Fairmont Street
Dallas, Texas 75219, U.S.A.

PROFESSOR SVEN LANDGREN

Universitetet
901 85 Umeå

PROFESSOR LARS LEKSELL

Karolinska Sjukhuset
104 01 Stockholm

DOC ULF LINDBLOM

Karolinska Sjukhuset
104 01 Stockholm

DOCENT ERLAND LYSSELL

Sahlgrenska Sjukhuset
413 45 Göteborg

DOC B. MEYERSON

Alviksvägen 158
161 38 Bromma

PROFESSOR IAN MACNAB

The Wellesley Hospital
160 Wellesly Street E
Toronto 284, Ontario, Canada

DOC ULF NILSSONNE

Norrbackainstitutet
Box 6403
113 82 Stockholm

DOC YNGVE OLSSON

Sahlgrenska Sjukhuset
413 45 Göteborg

PROFESSOR DAVID OTTOSON

Veterinärhögskolan
104 05 Stockholm

PROFESSOR E. R. PERL
Dept. of Physiology
University of Utah Medical Center
50 North Medical Drive
Salt Lake City, Utah 84112, U.S.A.

DOC ANDERS PERSSON
Klin. neurofysiol. centrallab.
Karolinska Sjukhuset
104 01 Stockholm 60

DR PHILIP SAGER
Bispebjerg Hospital
Bispebjerg Bakke 23
2400 Köpenhamn, Denmark

DR WILLIAM H. SWEET
Massachusetts General Hospital
Boston, Mass., U.S.A.

PROFESSOR HUGO THEORELL
Med. Nobelinst. för Biokemi
104 01 Stockholm

DOCENT CARL-AXEL THULIN
Neurokirurgiska kliniken
Lasarettet
901 85 Umeå

MED. LIC. ERIK TOREBJÖRK
Akademiska Sjukhuset
Fack
750 14 Uppsala

PROFESSOR DR G. TÖNDURY
Direktion der Anatomie
CH-8006 Zürich
Gloriastrasse 19
Switzerland

PROFESSOR P. D. WALL
University College London
Dept of Anatomy
Gower Street
London W.C. 1, England

DOC G. WALLIN
Akademiska Sjukhuset
Fack
750 14 Uppsala

PROFESSOR A. G. M. WEDDELL
University of Oxford
South Parks Road
Oxford, England

PROFESSOR C. WEGELIUS
Sveavägen 166 L
113 46 Stockholm

PROFESSOR INGMAR WICKBOM
Sahlgrenska Sjukhuset
Röntgendiagnostika avd II
413 45 Göteborg

PROFESSOR YNGVE ZOTTERMAN
Wenner-Gren Center
Sveavägen 166 J
113 46 Stockholm

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OPENING ADDRESS

HUGO THEORELL

Ladies and Gentlemen:

It is my privilege as President of the Wenner-Gren Center Foundation to extend to all of you our most hearty welcome to Stockholm and to this symposium on "cervical pain". Our idea was that it might be fruitful to arrange a discussion between representatives of several disciplines dealing with this particular problem from different points of view. The surgeons, neurosurgeons and orthopaedic surgeons responsible for the therapy should confront their experience and problems with anatomists, pathologists and neurophysiologists with special interests in the neurophysiological mechanisms of pain.

"Cervical pain" is mainly a disease of the higher ages. I have heard figures telling that some 65% of people above the age of 65 have had or still suffer from this disease. Since the average lifetime, at least in "developed" countries, is increasing we must expect the disease to become more and more frequent, even if we shall hear later that its typical symptoms have been found in skeletons already from the Viking time.

Unfortunately no generally effective therapy has been found, in spite of many approaches being made, varying from advanced surgery to all sorts of conservative means. We have the feeling that therapeutically active doctors sometimes know too little about the physiological mechanism of pain, how pain is influenced by the anatomical changes observed on X-ray pictures or during surgery in the cervical region.

We firmly believe that only common efforts can lead to decisive progress, and it is our sincere hope that this symposium shall become a step forward in this direction.

OPENING REMARKS

CARL HIRSCH

ON BEHALF of the organizing committee of the medical research council and the Wenner-Gren Center it is my pleasure to welcome you to this symposium on Cervical Pain. This meeting is an attempt to bring together outstanding basic scientists and clinicians to discuss one of the most common painful conditions mankind is suffering from. Cervical pain is subject to controversial opinions about the clinical interpretation and the therapeutic aims. Recent morphological and physiological data have made it necessary to present and to discuss them in order to open a broader approach towards future research and clinical management.

Our programme is made up in such a way that the first day will be devoted to the clinical picture including pathomorphology, biomechanics, radiographic information and clinical treatment.

The second day we will have neurophysiology and the last day we hope to be involved in a general discussion trying to utilize the information presented. We all hope that this symposium will be worth while and that the results of our exchange of ideas can be published. I wish the participants and invited guests heartily welcome.

THE CLINICAL PICTURE

RAGNAR FRYKHOLM

Dept. of Neurosurgery, Södersjukhuset, Stockholm

I THINK it would be quite irrational to try to speak about the symptomatology of cervical pain without making at least some reference to the anatomy, biomechanics and pathology of the region, but I will try to make these digressions from the main subject of my presentation as brief as possible.

Each normal cervical disc is functionally a saddle-joint composed of three separate articulations. In the main central one, the nucleus pulposus serves as joint fluid. The two additional uncovertebral joints are developmentally only fissures in the lateral parts of the annulus fibrosus, but nevertheless serve as articulations. In disc degeneration, however, the three joint-cavities may merge into a single one.

Altogether the normal cervical spine contains no less than thirty-five separate joints and is thus the most complicated articular system of the body. Its articular function is to permit the various movements of the head in relation to the trunk.

The cervical spine is subjected to a great amount of continuous stress and strain during the normal activities of life. Even when we speak, exhibit our personal pattern of gestures and so on, our heads are moved much more than most people are aware of. Everyone who has suffered from a painful and stiff neck can testify how disabling such a condition can be.

The prerequisite for a normal function of the cervical spine is that all movements can be performed without injury to the cord and the millions of nerve-fibres which pass through it and the intervertebral foraminae and the foramina transversaria, and furthermore that the vascular supply of these structures including the posterior fossa remains undisturbed.

On ventroflexion the vertebral canal is lengthened and on dorsiflexion it is shortened to a considerable degree, as shown by Fig. 1.

The cord has an amazing capacity to adapt itself like a snake to these considerable alterations in the length of the canal. It is elongated and gets thinner on ventroflexion and is shortened and becomes thicker on dorsiflexion, as has been conclusively demonstrated by Breig.

In a canal of normal width such changes in length and diameter of the cord can take place without any injury being inflicted, but in cases with advanced spondylosis the canal

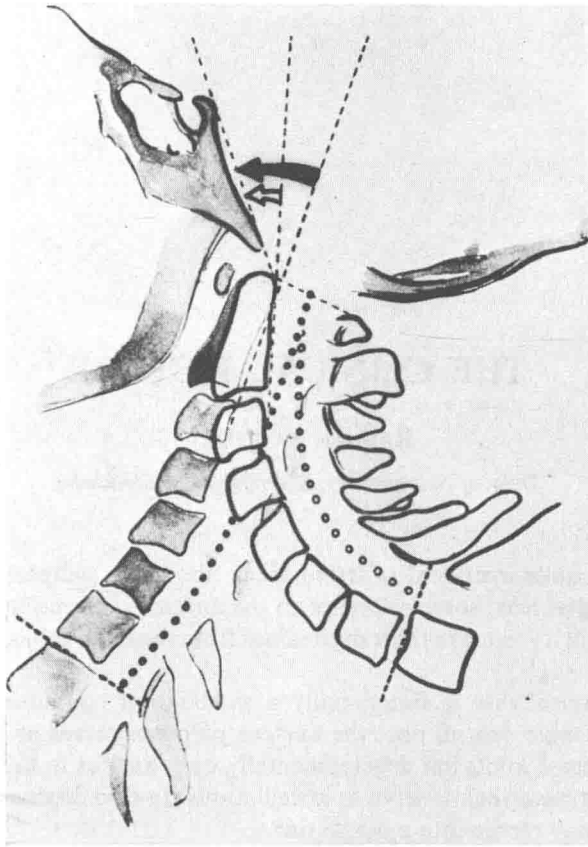


FIG. 1. Diagram drawn from two superimposed radiographs, one with the cervical spine in maximal ventroflexion, the other in dorsal extension, with the base of the skull as reference point for both. The spinal canal is seen to be significantly elongated on ventroflexion and shortened in dorsal extension. The difference in length between the two extreme positions is more pronounced for the posterior than the anterior contour of the canal. (Courtesy of Alf Breig, *Biomechanics of the Central Nervous System*, Almqvist & Wiksell, Uppsala, 1960, p. 27.)

may be constricted to such a degree that the cord may suffer severe damage even by ordinary movements of the head. Figure 2 shows the ventral aspect of a case with advanced spondylosis. Figure 3 illustrates the dorsal aspect after removal of the laminae and articular facets.

Concerning the root-filaments, it is important to remember that these are stretched on ventroflexion and slackened upon dorsiflexion, Fig. 4.

In order to permit such movements the nerve roots have been provided with funnel-shaped root-pouches. Otherwise they would be sharply angulated at their points of exit from the dural sack and easily traumatized.

Farther laterally, the radicular nerves usually have—or should have—a central position within the intervertebral foramen. Otherwise friction may occur against the hard linings of the foramen, which may result in reactive fibrosis of the nerve-roots and their sheaths.

An anatomy, which is completely perfect from all functional points of view, is unfortunately seldom provided by nature, except to a small privileged group of individuals.

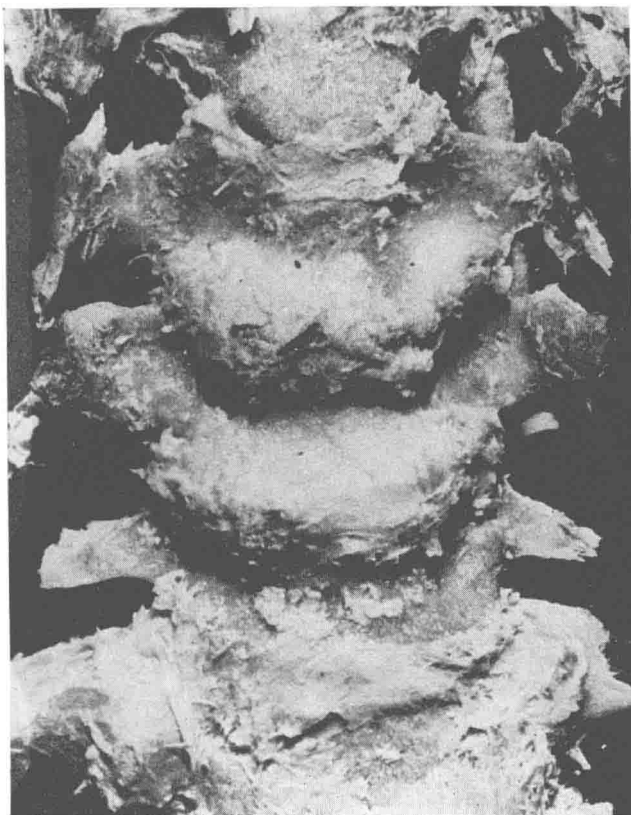


FIG. 2. Ventral aspect of cervical spine with advanced spondylosis. Extremely large osteophytic protrusions are seen to emerge from the ventral and lateral parts of the C5/6 and C6/7 discs.

Congenital or developmental aberrations from an ideal configuration of various structures may occur in all parts of the body, predisposing the individual in question to dysfunctions of various kinds.

The cervical region is no exception from this general rule. Here we may find—even in young individuals—many cases with malformed root-pouches, occasionally together with radicular nerves sharply angulated upwards or nerves with an eccentric location in the intervertebral foramen (Fig. 5).

Such malformations occur with increasing frequency as age advances, which probably must be attributed to the gradual shortening of the cervical spine due to osteoporosis and spondylosis, seen in Fig. 6.

Cervical pain has a large number of different clinical manifestations. The various types can, however, be put into three main groups:

1. *Local cervical pain* caused by a pathologic lesion itself somewhere in the cervical structures.
2. *Brachial neuralgia* caused by compression of the nerve-roots of the upper extremity.
3. *Cervical migraine*, a special type of headache elicited from the cervical region through mechanisms which are not yet fully understood.



FIG. 3. Dorsal aspect of the vertebral bodies and discs of the same cadaver specimen as in Fig. 2, showing that in this case the protrusions are of the same size around the entire circumference of the discs. Compare Fig. 8, which shows an example of an asymmetrically developed protrusion.

I. LOCAL CERVICAL PAIN

Due to the complex anatomy and biomechanics of the cervical structures, the whole system is of course very easily vulnerable.

A painful arthritis, for instance, affecting only a single one of the thirty-five joints will cause a spasm of the neck muscles and thus a significant impairment of normal mobility. A similar effect can be produced by trauma if one or several of the joints and their ligaments are sprained. Many additional causes for local cervical pain could be enumerated.

Pain and muscle spasm generate vascular spasm, causing additional pain and thus starting a vicious circle. Therefore, in a stiff and painful neck there is always the risk for the development of radicular irritation, especially in cases with spondylosis or anatomic anomalies of the type which predispose to the development of rhizopathies. Consequently I think it is extremely important to treat pain adequately and try to mobilize the neck by means of cautious manipulation. Local injection of xylocain into the tender spots may be of great help in this treatment.

Wry and stiff necks are by no means an ailment affecting only people of advanced age. Children and teenagers may also suffer from cricks in their necks, usually as the result of

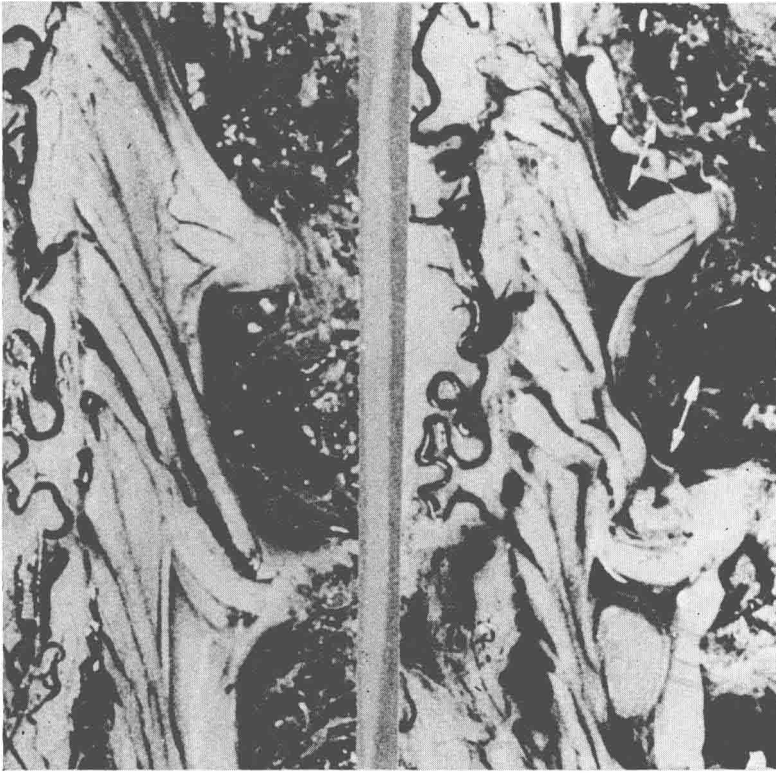


FIG. 4. In ventroflexion (*left*) the root-filaments are stretched and, in addition, the root-sleeves come into contact with the superadjacent pedicle, whereas in dorsal extension (*right*) the filaments are slackened and the root-sleeves move caudally away from the pedicles (arrows). (Courtesy of Alf Breig, p. 106 of the monograph titled under Fig. 1.)

some minor trauma or some uncontrolled movement. On X-ray examination there is usually some evidence of subluxation at one segmental level.

Zuckschwert (1956) has reported small menisci in the intervertebral joints, which he thinks may become incarcerated and lock the joint.

Most of the young patients regain normal mobility within a few days without any treatment. If not, adequate treatment should be started immediately, as otherwise serious complications may ensue, for instance a spastic torticollis, of which I have seen a couple of examples, with this special etiology.

II. BRACHIAL NEURALGIA

Brachial neuralgia is usually caused by mechanical root-irritation in the lower cervical region. If root-compression is sufficiently severe to cause complete denervation, all pain subsides.

I intend to discuss briefly and in general terms only two pathologic conditions, namely cervical spondylosis and acute disc herniation. Other aetiologies to brachial neuralgia, such as cervical ribs, costoclavicular compression, tumours, etc., are beyond the scope of this symposium.