LUMBAR DISC PROLAPSE IN YOUNG POPULATION

Essay
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Submitted by

Medhat Mohsen Safwat
(M.B., B.Ch.)

Under Supervision of

PROF. DR. SAMIR ABD ELHAMEED GALAL
Professor of General Surgery
Faculty of Medicine, Cairo University

PROF. DR. AHMED MOHAMED EISSA
Professor of Neurosurgery
Head of Neurosurgery Department
Faculty of Medicine, Cairo University

DR.HESHAM MOHAMED HOZAYEN
Assistant Professor of Neurosurgery
Faculty of Medicine, Cairo University

Faculty of Medicine
Cairo University
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Abstract

Common causes of back pain include nonspecific pain or muscle strain, herniated disk, spondylolysis, scoliosis, and Scheuermann's kyphosis. Less common causes include tumor, Infection and sickle cell crisis.

If nonspecific back pain is suspected, treatment may include home-based exercise, physical therapy, or nonsteroidal anti-inflammatory drugs.

If the history And physical examination suggests underlying pathology, radiography, complete blood count, erythrocyte sedimentation rate and a C - reactive protein measurement should be performed.

Follow-up magnetic resonance imaging, computed tomography, or bone scanning may be needed depending on the suspected cause.

It is generally accepted that the following factors warrant immediate evaluation: patient age younger than four years, persistent symptoms, Self-imposed activity limitations, systemic symptoms, increasing discomfort, persistent nocturnal pain, and neurologic symptoms.

Key Words :

Annulus fibrosus - Gadolinium - Nucleus pulposus .

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Medhat M. Safwat
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LIST OF ABBREVIATIONS

AF	**:**	Annulus fibrosus
ALL	**:**	Anterior longitudinal ligament
C.T.	**:**	Computerized tomography
CSF	**:**	Cerebro-spinal fluid
EMG	**:**	Electromyography
ENG	**:**	Conventional neurography
ESR	**:**	Erythrocyte sedimentation rate
FNST	**:**	Femoral nerve stretch test
FSU	**:**	Functional spinal unit
Gd	**:**	Gadolinium
HNP	**:**	Herniated nucleus pulposus
IDP	**:**	Intradiscal pressure
IJO	**:**	Idiopathic juvenile osteoporosis
LBP	**:**	Low back pain
MEP	**:**	Motor-evoked potentials
MRI	**:**	Magnetic resonance imaging
NP	**:**	Nucleus pulposus
PGE_2	**:**	Prostaglandin E_2
PKFP	**:**	Prone knee flexion provocative test
PLL	**:**	Posterior longitudinal ligament
ROM	**:**	Range of motion
SEP	**:**	Somatosensory- evoked potentials
SLR	**:**	Straight leg rising

SLRT : Straight leg raising test

STIR : Short time inversion recovery

T_1 WI : T_1 weighted image

T_2 WI : T_2 weighted image

VB : Vertebral bodies

LIST OF TABLES

LIST OF FIGURES

Page

LIST OF CONTENTS

INTRODUCTION

The intervertebral discs are complex structures that consist of a thick outer ring of fibrous cartilage termed the annulus fibrosus, which surrounds a more gelatinous core known as the nucleus pulposus; the nucleus pulposus is sandwiched inferiorly and superiorly by cartilage end plates. The intervertebral discs lie between the vertebral bodies, linking them together. They are the main joints of the spinal column and occupy one-third of its height. Their major role is mechanical, as they constantly transmit loads arising from body weight and muscle activity through the spinal column .they are approximately 7-10 mm thick and 4 cm in diameter in the lumbar region. **(Roberts S, 1989)**

Disc degenerates far earlier than other musculoskeletal tissue. **(Boos N, 2002)**

Lumbar disc herniation is rare in children and adolescents. Although the true incidence rate is not known, the incidence of surgery for disc herniation in patients less than 20 years of age is less than 3%. **(Borgensen SE et al., 1974)**

Males appear to be affected more often than females, by a ratio of 2:1. **(Clarke NMP, 1983)**

Trauma is the precipitating cause in more than 50% of cases in children and adolescents, acute trauma may occur in injuries such as falling from a height or motor vehicles accidents, however, chronic repetitive trauma seen in athletics injuries, and lifting injuries have also been observed **(Hession EF,1993).**

The clinical features of lumbar disc herniation are not always the same for young and adults. This may contribute to delay in diagnosis of this aliment in children and adolescents .Ghabrial and Tarrant reported that 41 of their 87 adolescents with disc herniation had no leg pain and signs of true neurological deficits were often absent. **(Ghabrial YAE, 1989)**

However, abnormal posture and scoliosis, severely restricted lumbar range of motion, positive straight leg raising sign, pain with valsalva's maneuver and abnormal shuffling gait are also been reported by many authors.**(Kurihara A,1980)**

There are a number of differential diagnoses to be considered in an adolescent with a lumbar disc. The most important ones to rule out are apophyseal ring fracture (accounts for between 19-32% of disc herniations in 13 to 14 years old), disc infections and tumors causing radiculopathy .Radiographs, blood work and MRI help in reaching the diagnosis by ruling out other causes. **(Luukkonen M, 1997)**

Authors argue that conservative treatment is ineffective in children; it has been effective in as few as 25% of cases. If symptoms persist at a level that impairs return to normal routine and physical activity, then conservative therapy may be considered a failure .At this point, operative treatment may become necessary. The goal of surgical treatment is to remove pressure from the nerve root and thecal sac. When the patient has a focal herniation with discrete pressure on the nerve root, annulotomy and removal of the extruded nucleus pulposus fragment is likely to be successfully by it self. Large, board-base bulges, often seen in subligamentous herniation, may require more extensive discectomy. In these cases, enough material must be removed that the thecal sac is

decompressed across the entire breadth of the extrusion. Surgical excision is typically carried out through a microdiscectomy approach. **(Deluca PF, 1994)**

Surgical treatment of pediatrics and adolescent patients with disc herniation is generally satisfactory. Eighty – five percent of patients in these age groups experience a good to excellent results after microdiscectomy and nerve root decompression. Radicular pain and back pain typically resolve soon after the operative procedure, and patients return to function rapidly. Long-term results tend to be good ,but these patients experience degeneration and further problems because of their predisposition to disc degeneration and because of the normal progression of disc disease seen in the broader population. **(Fisher RG,1981)**

In Ebersold's study of patients, 21% underwent a second spine operation during a 34- year follow up. **(Ebersold MJ, 1987)**

Other authors have noted a 10% reoperation rate over a 3-year period of follow up. **(Fisher RG, 1981)**

AIM OF THE WORK

1. Outline the morphology and biochemistry of normal discs and changes that arise during degeneration.
2. Outline clinical pictures, investigations and differential diagnosis of lumbar disc prolapse in children and adolescents.
3. Outline different modalities of treatment, twenty cases are illustrated.
4. Outline the different disc levels to be affected in such young population (less than 25 years old), and which level has the highest prevalence.
5. Out line the response to different treatment modalities.

EMBRYOLOGY

During the 4th week of development, cells of the sclerotomes shift their position to surround both the spinal cord and the notochord (Fig.1). This positional change is affected by differential growth of the surrounding structures and not by active migration of sclerotome cells. This mesenchymal column retains traces of its segmental origin as the sclerotomic blocks are separated by less dense areas containing intersegmental arteries (Fig.1A).

During further development, the caudal portion of each sclerotome segment proliferates extensively and condenses (Fig.1B). This proliferation is so extensive that it proceeds into the adjacent intersegmental tissues and binds the caudal half of one sclerotome to the cephalic half of the adjacent sclerotomes (See arrows in Fig.1A and B). Hence, by incorporation of the intersegmental tissue into the precartilaginous vertebral body; (Fig. 1B) the body of the vertebra becomes intersegmental in origin.

Mesenchymal cells located between cephalic and caudal parts of the original sclerotome segment do not proliferate but fill the space between two precartilaginous vertebral bodies. In this way, they contribute to formation of the intervertebral disc (Fig.1B).Although the notochord regresses entirely in the region of the vertebral bodies; it persists and enlarges in the region of the intervertebral disc. Here it contributes to the nucleus pulposus, which is later surrounded by circular fibers of the annulus fibrosus. Combined, these two structures form the intervertebral dis*cs* (Fig.1C).