SMILES FROM THE OLD REELS: CLINIC-ANATOMICAL STUDIES ON THE CERVICAL BACKBONE

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ABSTRACT

These studies coincide in time with the establishment of the Department of Anatomy in Varna. Large amount of human material was examined macroscopically, with x-ray and with histological methods. Data of importance to clinics, concerning the bony skeleton, the intervertebral disks, the joints and the vertebral artery were obtained. In addition, the age related alterations of the cervical backbone, known to give rise to complicated neurological and vascular syndromes, were examined.

Key words: *cervical backbone, age related alterations*

INTRODUCTION

The changes of the cervical backbone affect lot of other structures, as a result of which complicated pain and vascular syndromes appear. With regard to this, as well as because of the great practical interest and the absence of relevant anatomical studies, we undertook the task to investigate the normal structure of and the age related alterations in the cervical backbone.

MATERIALS AND METHODS

Examined was a great amount of material - 200 human backbones (100 non-fixed) of grown-up individuals 15 to 88 years old distributed in three age groups, and 30 of fetuses, newborn children and children up to 15 years of age. In addition to macroscopic inspection, applied were conventional x-ray controls, contrast filling of the blood vessels, and histological examinations. Attention was paid to the bony skeleton, to the intervertebral disks, joints and foramens, and to the blood supply of normal and age altered backbones.

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RESULTS

Important features of the cervical vertebrae are their procc. uncinati (unci corporis). They arise from the upper surfaces of the vertebral bodies, are highest (6-7 mm) at C5 and C6, surround from lateral the intervertebral foramens, and are well visualized in facial x-ray pictures. The processes play an important role in the cervical backbone mechanics. With advancing age they undergo deformations and, as a result, become leading in the backbone pathology by changing the relationships with the spinal nerves and the vertebral artery (Fig. 1). The intervertebral foramens are situated between the adjacent vertebral notches, procc. uncinati and intervertebral joints. In our study their content was examined in horizontal and vertical sections. The lower two thirds of each of them were occupied by the spinal nerves, and the upper third - by the blood vessels. The foramens are well demonstrated in semi-side (oblique) x-ray pictures.

The cervical intervertebral disks make up about 45% of the length of the cervical backbone. Aside, they extend to the procc. uncinati, and in horizontal sections exhibit homogenous structure,

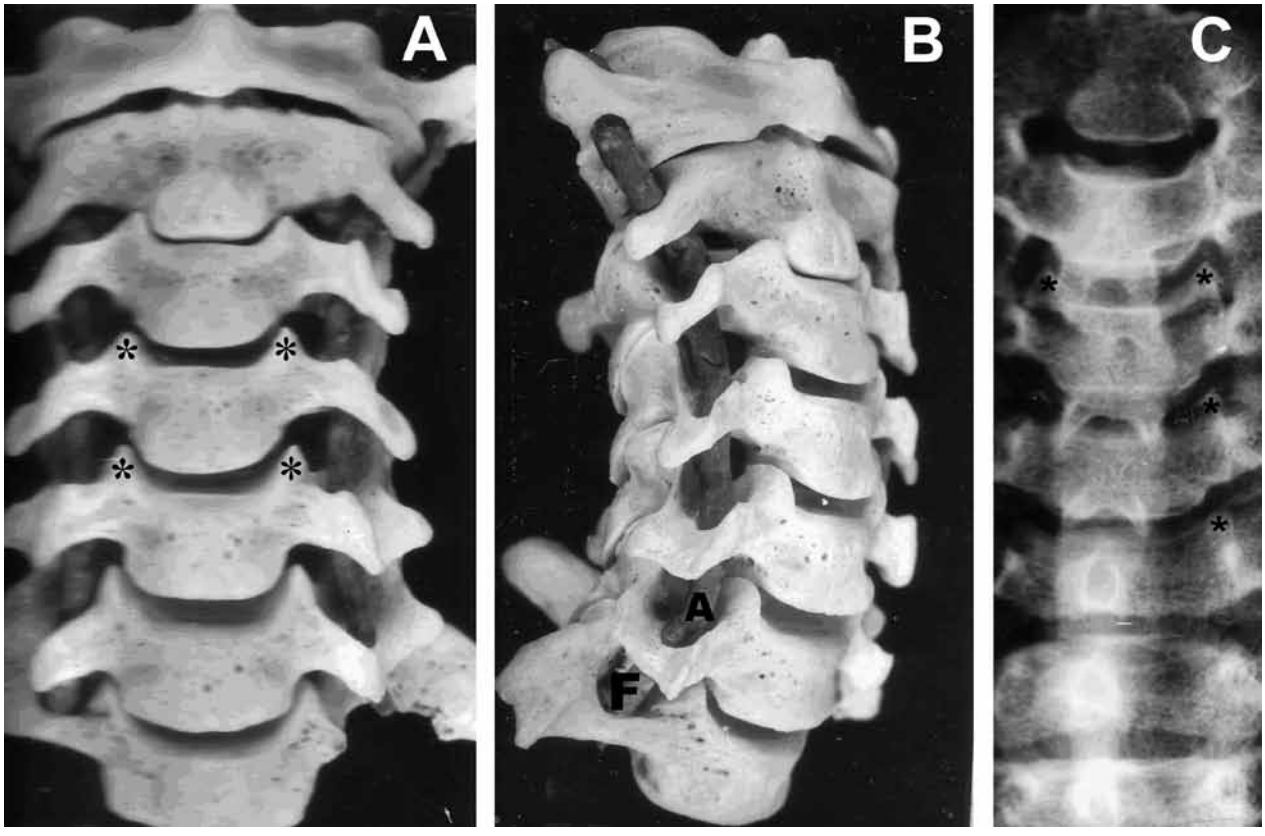

Fig. 1. Bony skeleton.
*A. Anterior view. * - procc. uncinati*
B. Semi-lateral view. F - foramen intervertebrale, A – a. vertebralis
*C. Face x-ray picture. * - procc. uncinati*

with the nucleus pulposus protruding to the bodies of the neighboring vertebrae. Microscopically, the structure of disks is polymorph. Nucleus pulposus contains remnants of chorda dorsalis, and electron microscopically a three-dimensional network of thin fibers with globular structures (glycosaminoglycans) included in it is visualized. Annulus fibrosus is composed of collagen lamellae inserted in the cartilage of the terminal plates. They play an important role in the disk trophicity (Fig.2).

The intervertebral joints are oriented in the frontal plane, the articular cartilage is thicker at the periphery, and the synovial membrane here forms meniscoid folds that could be considered important to the neck backbone blockades.

The neck backbone receives blood from branches of the a. vetebralis (the latter runs in the canalis transversalis). In the intervertebral segment the artery is situated ventro-lateral to the relevant foramens, in close proximity to the proc. uncinatus and the joint. In addition to branches to the spinal cord running along the extent of the roots of the spinal nerves, the artery gives small branches to the vertebrae (four per each vertebra), branches to the joints and the surrounding muscles. These vessels are well visible after contrast filling.

Age related alterations of the cervical backbone were observed first in the intervertebral disks. The degeneration starts with reduction of the highness of the disks, loss of their homogeneity, and occurrence of clefts between the procc. uncinati and the upper vertebra - i.e. unco-vertebral joints. At advanced degeneration the structure of disks is completely destroyed. In 400 disks investigated of individuals 35-80 years old, it was established that, after 65 years of age, almost all of the disks have lost their normal structure, with the C4-C5 and the C5-C6 disk being most frequently, and the last cervical one - most rarely, affected (Fig. 3).

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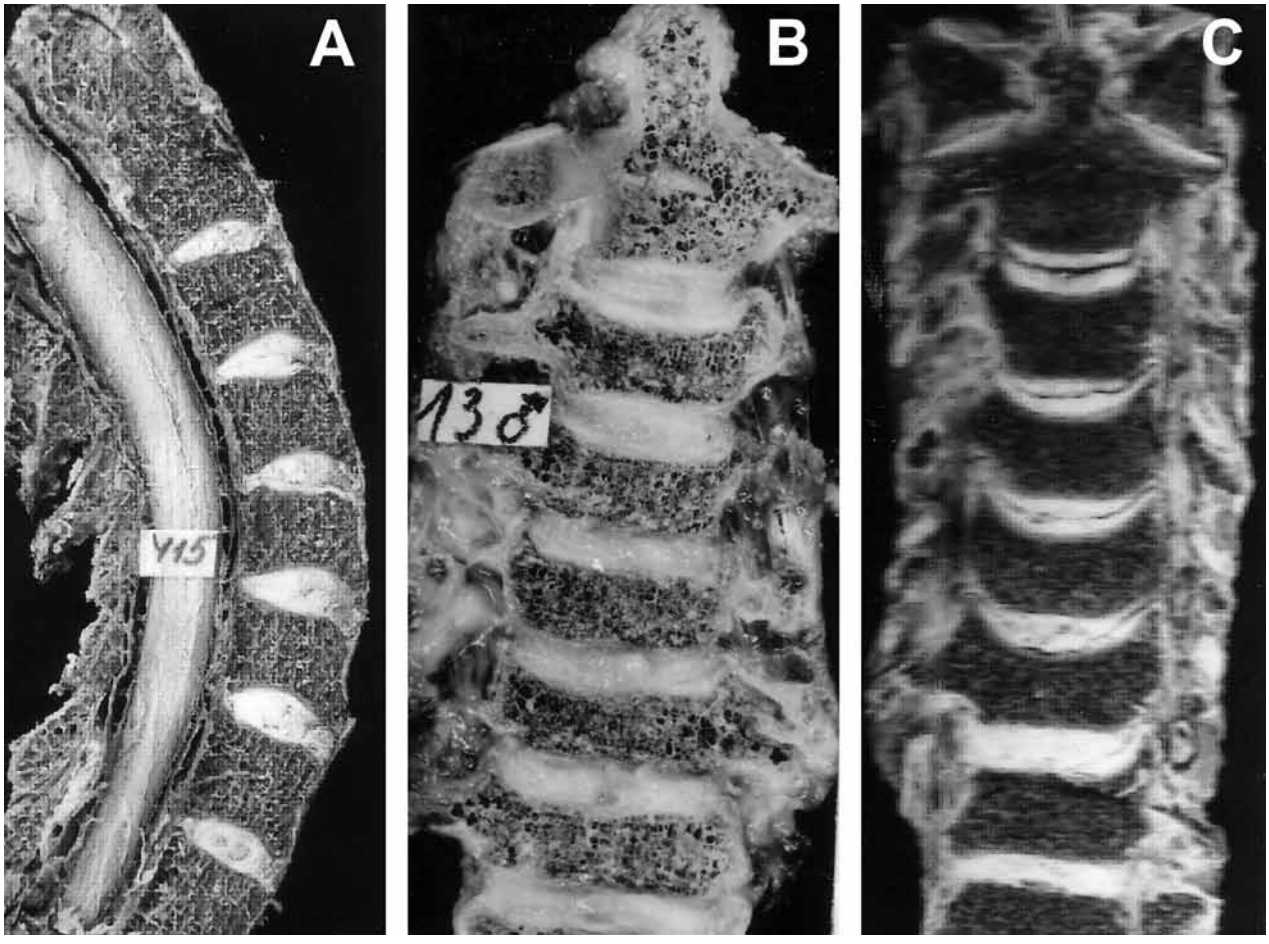

Fig. 2. Intervertebral disks.
A. Saggital section.
B. Frontal section (neck backbone of a 13 years old child).
C. Frontal section (initial disk degeneration - see transverse clefts in the disks).

Characteristic age related alterations of the cervical vertebrae are also the unco-vertebral exostoses. These protrude to the intervertebral foramens and the transversal canal, as a result of which deformation of the foramens and compression of the spinal nerves and the vertebral artery occur. The exostoses give rise to undulations of the artery, congestion of its wall and decrease of the lumen with, resulting from this, clinical manifestation of basilar insufficiency.

CONCLUSION

Although jokingly entitled "Smiles from the old reels", the present study on great amount of material from human backbones is a good example of how the anatomical studies could help resolve actual clinical problems.

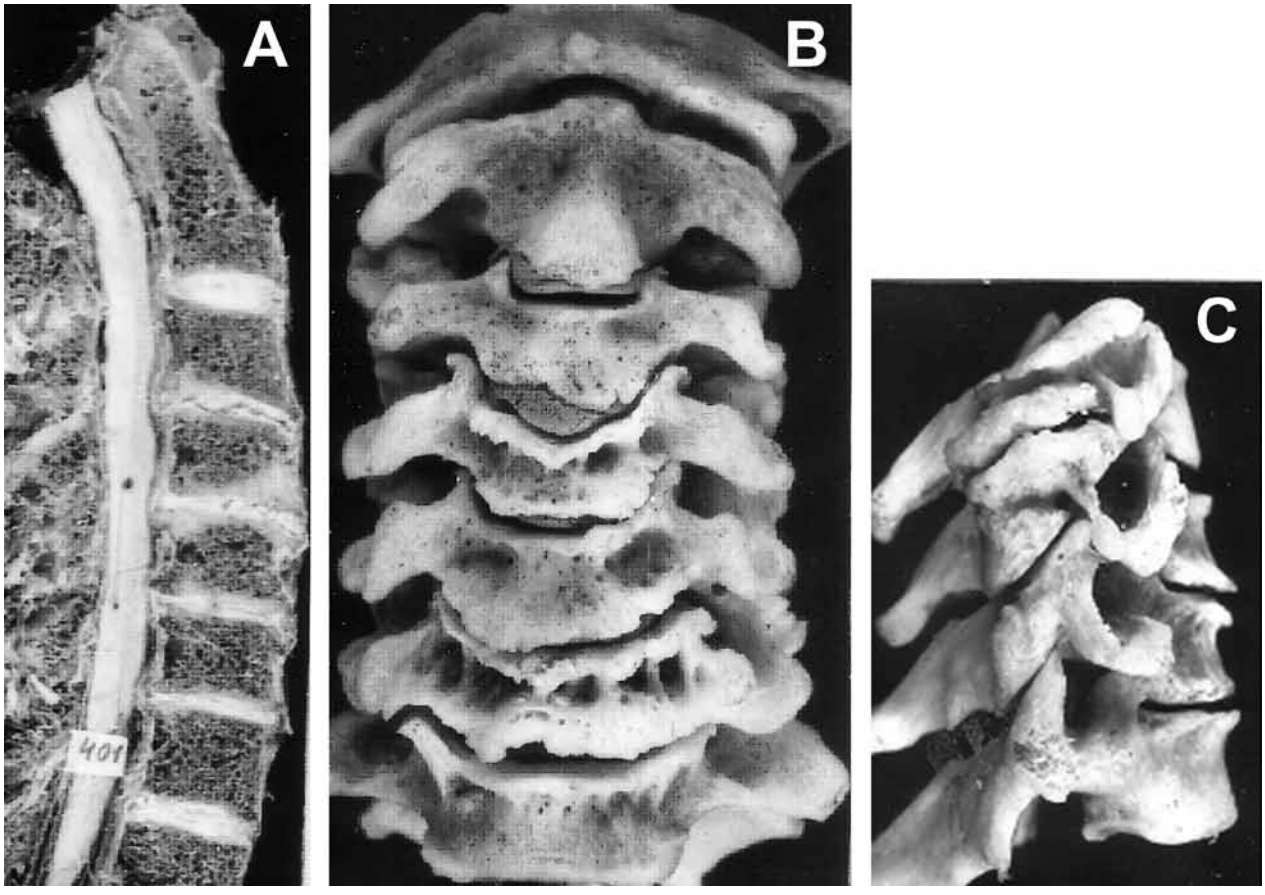

Fig. 3. Age related alterations of the neck backbone
A. Degenerated intervertebral disks (saggital section).
B. Exostoses of the bodies and the procc. uncinati (anterior view).
C. Osteoarthrosis and deformation of the intervertebral foramens (lateral view).

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