

## SOME AGE PECULIARITIES OF THE WALL STRUCTURE OF ILIAC ARTERIES

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The age peculiarities of the wall structure of iliac arteries reveal certain interest because of the bibliographic data about prenatal constructive disorders (Marinov, Tabakov — 1980) combined with changed metabolism of calcium (Meyer — 1968) and lipides (Sinzing et al. — 1975).

This metabolism plays an important role for the development of atherosclerotic processes located in the cited zone; therefore, the object of the present study was to study the constructive peculiarities during pre- and post-natal ontogenesis. The investigation of these vessels is actual also due to the fact that the three iliac arteries: common, internal and external are located next to each other, in similar conditions. But because of their different calibre and deviation-angle they possess various functional duties. All that allows the thorough analysis of the influence of the aforementioned factors upon the structure of the arterial wall.

### Materials and methods

The study covers three age-groups (corpses from the Department of Anatomy, Higher Institute of Medicine): I — 10 foetuses with length of 13—39,5 cm (serial histological cuts with thickness 6 micromicrons, interval 60—180 micromicrons, were prepared); II — 6 children between 3 and 4½ years; III — 6 people died at the age of 9, 13, 18, 39, 55 and 88 years. 75 preparations from magistral zones of the three vessels (far from the places of the branches) were studied (the preparations are from both II and III group). Staining with hematoxylin-eosin, with orcoin and after the method of Van Gieson was applied.

### Results and discussion

The preparations from the foetuses of I group show thin intima of the studied arteries; it has only one layer endothelium and well developed homogeneous elastic inner membrane. Their media is also thin with several rows of circular-orientated smooth-muscle cells. The longer the foetuses are the thicker the wall of their iliac arteries is. There is a certain variety of the structure of these zones which can be divided into 3 main types: I — local projections of intima with small sizes as a result of developing thin subendothelial layer and double inner elastic membrane (either by splitting of the membrane into two ideally equal lists or by forming of elastic lamellas inside or outside of the inner elastic membrane). These formations are identical to those reported by Vankov, Nikolov, Chaldukov (1974) for the intima development in post-natal organogenesis, but in our cases we establish them prenatally. II — intima projections with bigger sizes located only in the intima with massive

subendothelial layer and proliferation of smooth-muscle cells orientated longitudinally or transversally. In these zones the inner elastic membrane forms 2 lists — subendothelial and subintimal with a destroyed integrity (sometimes). III — bundles of longitudinally orientated muscles in the media with deeply changed elastic skeleton. This leads to splitting of media particles and

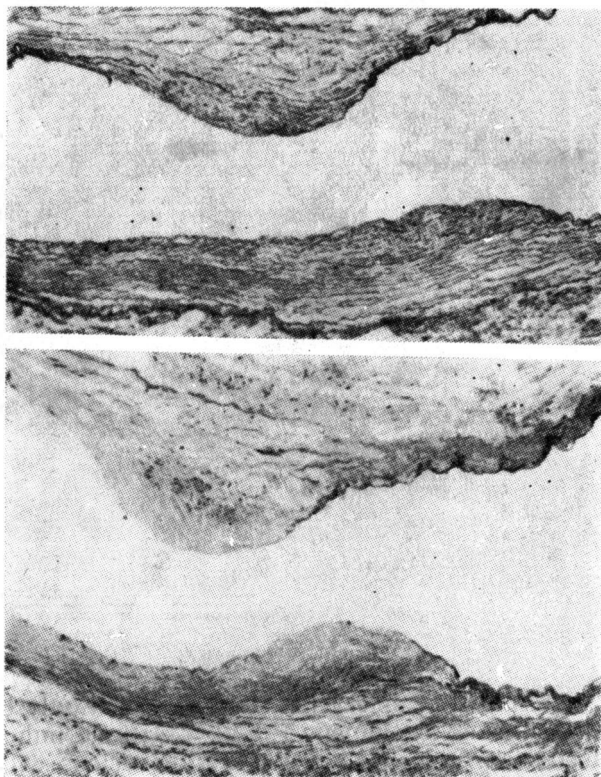


Fig. 1 a, b

formation of massive intimal projections. Similar data, but concerning other arteries, reports Robertson (1960). Later we established them in the femoral artery (Marinov — 1977; Marinov, Tabakov — 1980) and in the present study — in the common and internal iliac arteries during prenatal development. The sizes and thickness of intimal projections from II type are quite considerable; therefore we presume it will be suitable if we define them «Intimal thickenings» (fig. 1 — a, b).

The serial study of histological cuts and graphical reconstruction of the length of iliac arteries of foetuses (I group) allows the location of the described intimal thickenings from proximally to distally: 1) Bifurcation of the abdominal aorta — proximal zone of the common iliac artery. 2) Bifurcation of the common iliac artery — extent of the internal iliac artery. 3) Zone of little branches of the external iliac artery proximally of the inguinal plica. From the cited 3 locations the first 2 are more constant and with considerably bigger sizes.

Children aged 3—4 years show thinnest wall of their external iliac artery compared to the other two iliac arteries. Its intima is thin and equally developed along the whole vessel's lumen. It is formed by 1 or 2 elastic membranes, — subendothelially or subintimally. Between both membranes is located a thin connective-tissue layer with single muscle fibres longitudinally orientated.

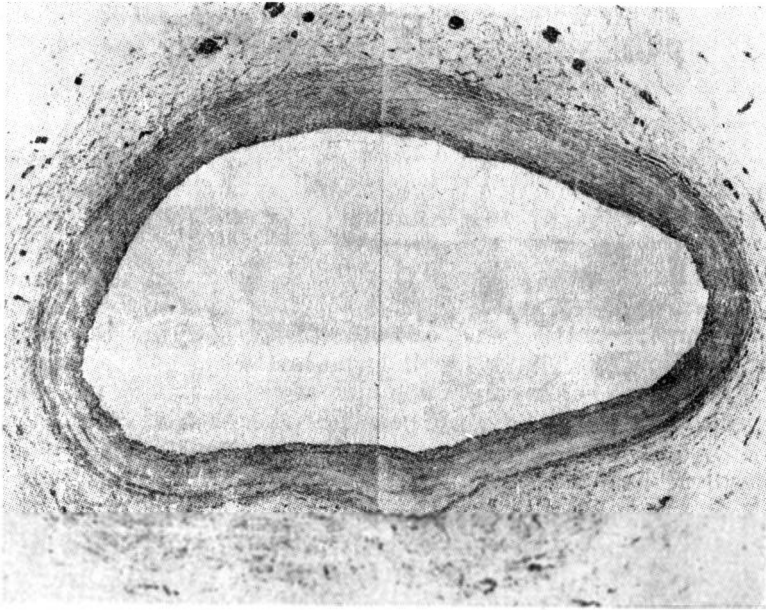


Fig. 2

The media of the external iliac artery in this age is built only by circular muscles with equal thickness of the lumen. The wall of the common and specially internal iliac arteries is irregularly thick and with various structure of the lumen. There are thicker and thinner regions (fig. 2) which is due to intimal projections of II and III type, i. e. those ones which involve only intima or intima and media together (fig. 3 — a, b). Projections from II type are capable of involving up to  $\frac{1}{2}$  of the vessel's lumen whereas those from III type —  $\frac{1}{8}$  of it. The thickness is contradictory — III type shows thicker wall than II one. Projections from II and III type are quite oftener in internal iliac artery than in external artery and in common one (in this age no projections are established in external artery).

The different structures of the three iliac arteries can be explained with the various angle of deviation; the common and internal iliac arteries have considerably sharp angle thus providing definite conditions of increased coefficient of local resistance and greater wall burdening. Similar data about coronary arteries report Velican and Velican (1978). Besides, the functional burden of the common and internal arteries in embryonal period is bigger due to the activity of the umbilical artery (Meyer — 1968).

With age the thickness of intima and media increases several times. The thicker wall corresponds with its more complex qualitative integrity. Intimal

projections from II and III type are registered in the external iliac artery unilaterally in a 39-year old individual. In the later age — 55 and 88, these projections are more expressed and numerous. In comparison with that these projections and the thickness of intima in the common and internal iliac arteries for the same age-group are quite considerable and more developed.

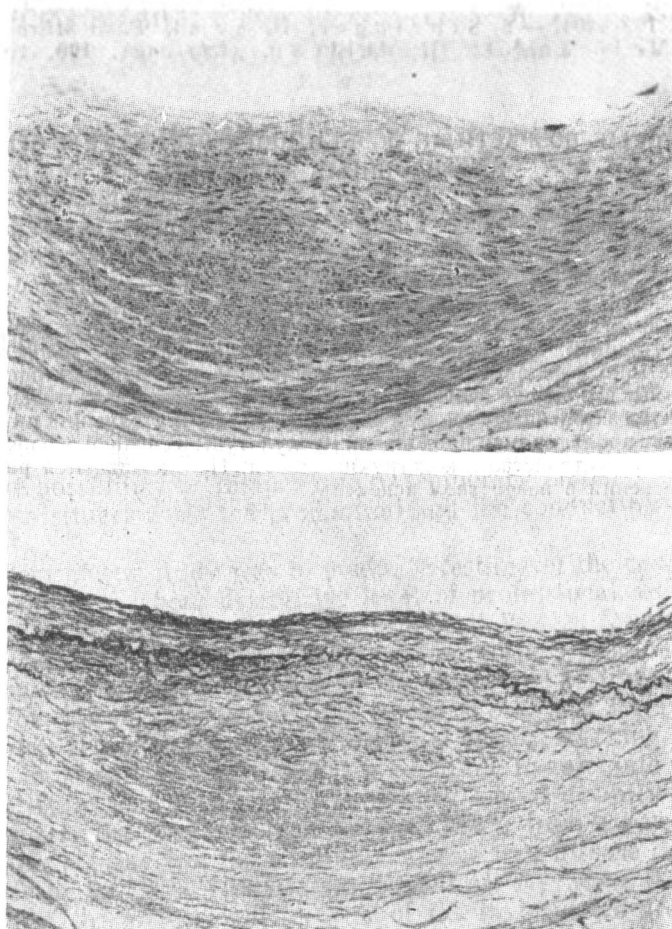


Fig. 3 a, b

All our data together with the possible influence of some other factors (genetical, immunological, etc.) show that the haemodynamic conditions have an important significance for the construction of the arterial wall.

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**НЕКОТОРЫЕ ВОЗРАСТНЫЕ ОСОБЕННОСТИ СТРУКТУРЫ СТЕНКИ  
ПОДВЗДОШНЫХ АРТЕРИЙ**

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## РЕЗЮМЕ

Изучены возрастные особенности структуры стенок подвздошных артерий — общей наружной и внутренней. Исследовались три возрастные группы: человеческие плоды, дети с трех до четырех с половиной лет и в возрасте от 9 до 88 лет. Установлены три типа утолщения интимы: небольшие очаги утолщения интимы, более значительные утолщения интимы, которые не затрагивают средней оболочки (медии) и утолщения интимы, которые образуются за счет пролиферации продольной мускулатуры в средней оболочке с пристоением из этого преустройством конструкции стенки. Прослеживаются развитие и эволюция этих изменений в возрастном аспекте.