Topography and structure of the uterine artery in a Kenyan population

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Background: Uterine artery, the principal source of blood supply to the uterus, is a branch of the anterior trunk of the internal iliac artery. It usually runs medially towards the cervix, crosses the ureter anteriorly and ascends as a single trunk to terminate by anastomosing with the ovarian artery. Variations in the origin, branching and course of this artery show ethnic differences. These variations are important during surgical procedures within the female pelvis but are unreported for black populations including Kenyans. Microscopically, the uterine artery is a muscular artery. Ultrasound guided studies demonstrate differences in the pattern of blood flow within the uterine artery among age groups. The histomorphological features that underlie the changes in vessel resistance are yet to be elucidated. Studies in other populations also show that postmenopausal changes in uterine arteries are consistent with increased intimal hyperplasia as seen in other vascular beds.

Objective: To describe the topography and structure of uterine artery at different physiologic states in a Kenyan population.

Design: Descriptive cross-sectional study

Setting: Chiromo, Nairobi city and Kenyatta National hospital Mortuaries

Subjects and methods: Human female subjects were included in this study. One hundred and fifty four (154) uterine arteries (77 left, 77 right) aged above 3 years obtained from 77 cadavers were used. Of these, one hundred and six (106) were used for the topography and forty eight (48) for studying uterine artery histomorphologic and morphometric changes by region, age and pregnancy status. Five millimetre histological sections were harvested at three sites from uterine artery and processed for routine histology then stained with Masson’s Trichrome, Hematoxylin and Eosin and Weigert Resorcin Fuschin/ Van Gieson stains for demonstration of general organization and elastic fibres respectively in the fore mentioned regions and physiologic states. The luminal and wall morphometry measurements were done by use of Scion Image Multiscan software. Leica BM Light microscope achieving magnification of X400 was used for histology and pictures taken using Fujifilm Finepix A900 (9.0 Megapixels) digital camera. Data were entered in the statistical package for social sciences and analyzed for means and standard deviations. One way Anova was used to test the differences in morphometry in pregnancy and reproductive age versus different regions.

Results: The uterine artery was a constant branch of the internal iliac artery. In 70.8% of cases, it was a second or a third branch of the anterior trunk. It ascended as a bifurcation or trifurcation in 23.8% and in 3.8% of the cases it lay posterior to the ureter. The tunica media of the proximal and middle segments comprised inner and outer zones consisting of circular and longitudinally oriented muscle respectively with penetrating vasa vasora in the reproductive age but only circular in the distal segment. Below the age of five years, only the proximal segment was patent, the middle and distal segments appearing like muscular cords, with longitudinal smooth muscles. After the age of five years, the middle segment but not the distal was patent. All the segments were patent after eight years. The tunica intima displayed areas of intimal hyperplasia starting in the reproductive age to postmenopause. During pregnancy there was, reduction in thickness of tunica intima, internal elastic lamina was very prominent, an increase in the amount of elastic fibres, number and size of vasa vasora. The wall thickness: luminal ratio decreased proximo-distally and with pregnancy. Intimal thickness increased with age, most marked in the postmenopausal period.

Conclusion: 46.3% uterine arteries show variable topography relevant in pelvic surgery. The artery is not fully canalized during early childhood, shows medial zonation in the proximal segments and apparent distal wall thinning in pregnancy probably related to regulation of blood flow to the uterus in various functional states. This artery displays microscopic changes which foreshadow atherosclerosis suggesting that it is vulnerable to this disease.