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Research Article

Surgical Anatomy of Uterine Arteries

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Abstract

The uterine arteries are the main blood vessels that supply blood to the uterus. The uterine artery is used widely in medicine when performing surgical interventions on the uterus, ovaries and other organs of the pelvis in various diseases of the female reproductive system. Therefore, it is very important to know all the nuances of the uterine artery topography to prevent complications.

The material of investigation was 15 cadavers of females without pathology of vascular system.

It was found that the uterine artery departs from the anterior trunk of the internal iliac artery. Three basic types of topographical relationships between the uterine artery and the ureter were established. We have classified six variants of the division of the uterine arteries into terminal branches.

The results can be used in gynaecology and obstetrics to reduce operative complications.

Introduction

The uterine arteries are the main blood vessels that supply blood to the uterus. They give off branches supplying different portions of the uterus and plays an important role in maintaining blood supply during physiological processes, such as the altering endometrium during the menstrual cycle and growth of the uterus during pregnancy [1,2]. Recently, arterial embolization of the uterine arteries as a preoperative adjunct or as an alternative to surgery has been used in treating uterine leiomyoma [3]. The widespread acceptance of this technique necessitates greater knowledge of the arterial anatomy of the female genital tract, such as the variants of the uterine artery, its origination, caliber, angle of arising, possible collateral relations, as well as projection and relationship with the surrounding structures has both theoretical and practical importance [4].

Often, the uterine artery is an object of surgical intervention [5,6]. During the surgical operations on the internal genitals, at the bleeding during childbirth, the surgeon often resorts to the ligation of the uterine artery or its branches [7]. Quite often, uterine artery ligation is performed as a preliminary stage in radical operations on the uterus. Intra-arterial chemotherapy of malignant tumours of the uterus, ovaries, as well as purulent-inflammatory processes of various localization has been carried out in a practice. Uterine artery angiography has used in the medicine for the purpose of diagnosing diseases of both the arteries (occlusions, anomalies, aneurysms, etc.) and surrounding tissues (tumours and other pathological changes) [8,9].

The purpose of the study is to establish the individual variability of the uterine artery.

Material and Methods

The material of investigation was 15 cadavers of females without pathology of vascular system. Two halves of each cadaver's pelvis were involved in research, so 30 specimens were used in total. The study was carried out with the help of dissection method, anthropometry, morphometry of blood vessels of pelvis and statistical processing (we used PC soft Statistica 10.0).

Results and Discussions

It was found that the uterine artery departs from the anterior trunk of the internal iliac artery, at a distance of 4-5cm from the bifurcation of the common iliac artery and slightly above the middle rectal artery. The uterine artery varies in the angle of arising, in the diameter, as well as in the direction to the edge of the body and neck of the uterus [10].

The uterine artery with a diameter of 0.18±0.05cm was longer a bit at the right (5.83±2.57cm). Length of the left artery was 5.37±1.22cm. After beginning, the uterine artery goes outside the ureter, and then it is directed to the uterus, passing in the inter-ligament space posterior and upward from the ureter. From the place of its intersection with the ureter at the distance of 1-2cm from the uterus, at the level of its internal throat, the artery goes in the transverse direction to the supravaginal portion of the uterus, giving the cervicovaginal branch to the cervix and the upper part of the vagina. Then the uterine artery gave the ascending branch, which in 79% of cases was submitted by one trunk, and there were 2-3 trunks in other

cases. In 12% of cases, the uterine artery gave 1-3 branches to the pelvic part of ureter. They can start from either the uterine artery itself or its cervicovaginal branch. These branches T-shaped bifurcate on the front or back walls of the ureter.

Having given the cervicovaginal branch, the uterine artery changes its direction and rises up along the lateral edge of the uterus to the uterine-tubal corner, where the artery in most cases is tightly adjacent to the edges of the uterus and only in some cases; it is spaced from the edges of the uterus at a distance of 0.5-0.8cm.

Topographical relationships between the uterine artery and the ureter are very important for surgery. We can distinguish three main variants:

1. The ureter crosses the internal iliac artery above the place of the beginning of the uterine artery from it;

2. At the place of beginning of the uterine artery from internal iliac;

3. Below the place of the beginning of the uterine artery from the internal iliac artery.

The relationship of the ureter with the beginning point of the uterine artery determines their topography all the way to the intersection described above in the lateral part of the parametrium located between the anterior and posterior sheets of the broad ligament of the uterus. The higher the ureter crosses the common iliac artery, the vertical and straighter its course in the lateral adipose tissue space of the pelvis, where it crosses the branches of the internal iliac artery, being down and medially from its main trunk. In these cases, the uterine artery in its initial part runs parallel to the ureter, forming an acute angle with its upper-lateral wall. It was noted that with a long common iliac artery, which is typical of the asthenic type of constitution, the angle between the uterine artery and the ureter increases on the right, and on the left it decreases. The ureter comes close to the descending part of the uterine artery in cases when, going down into the pelvis, it crosses the bifurcation of the common iliac artery or the external iliac artery. Then the uterine artery may be in close proximity to the lateral wall of the ureter or it may gradually move from its posterior wall to the anterior one, along which it continues its way down.

In general, the division of the uterine arteries into terminal branches can be represented in six variants:

Variant 1 - the right and left uterine arteries are divided into 2 branches: ovarian and fundal; the fundal one gives a small branch to the medial end of the fallopian tube. We met this variant in 38% of cases.

Variant 2 - each uterine artery is also divided into 2 branches, but one of them goes to the ovary, and the other is common to the fundus of the uterus and fallopian tube. The common branch is soon divided into terminal branches, almost equal in diameter - fundal and tubal. We met this variant in 29.8% of cases.

Variant 3 - each uterine artery is divided into 2 branches: the fundal and common for the fallopian tube and the ovary. We met that division in 17.4% of cases.

Variant 4 - the uterine artery is divided into 3 branches: the fundal, tubal and ovarian; that division was noted in 6.3% of cases.

Variant 5 - the uterine artery is also divided into 3 branches, but these branches are the fundal, ovarian, and artery of the round ligament of the uterus; we met that division in 1.1% of cases.

Variant 6 - unequal division of the right and left uterine arteries (asymmetric division) was found in 8.2% of cases.

Conclusions

Because of the study, the topographic relationship of the uterine artery has been described. The results of the study allow to systematize various relationships between the uterine artery and the ureter. This is very important in surgery. We also showed various variants for dividing the uterine artery into terminal branches and the frequency of their occurrence.

Conflicts of Interests

The authors declare that there is no conflict of interest.

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