MORPHOLOGICAL STUDY OF THE HUMAN OVARIAN AND UTERINE LIGAMENTS

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SUMMARY

Histological and anatomical study of the ovarian and uterine ligaments show that these two ligaments do not have the structure and function of a typical ligament. Furthermore, histological observations show that the ligaments are not separate ligaments but are continuous with one another. The outher longitudinal and the inner circular muscle fibers of the ligaments were found to be continuous with the myometrium of the uterine body.

Key Words: Morphological study, Light microscopy, Ovarian ligament, Uterine (Round) ligament.

INTRODUCTION

Most anatomy text-books do not provide a detailed description of the ovarian and uterine ligaments (1,2,3). These two ligaments are regarded as embryological remnants derived from gubernaculum (4).Although the uterine ligament is thought to maintain the anteverted and anteflexed position of the uterus (5). Mahran (6), showed that this was not the function of the ligament by cutting the uterine ligaments on both sides of 30 women during caesarean. The term ligament refers histologically,to structures with parallel collagen fibers, surrounded by loose connective tissue (7). Both the ovarian and uterine ligaments do not confirm, this histological definition (8,9,10,11,12). Morphological study of these two ligaments was considered worthwhile to enable a better functional understanding of their obstetrical and gynaecological importance.

MATERIALS AND METHODS

Gross anatomical observations were made on eight female cadavers. Histological specimens were obtained from fifteen patients aged 40-50 years, undergoing hysterectomy for uterine leiomyomas and chronic cervicitis.

In order to prevent any dimensional changes during fixation, the ligaments were pinned defining the uterine end, mid-portions and distal ends of the ligaments.

Sections of 0.6 μm were taken from junctional regions of the uterine ligaments and uterus, ovarian ligaments-ovary, from the mid-portions of the ligaments.

It was not possible to obtain sections from ovarian ligament-uterus junction.

RESULTS

Anatomical observations confirmed that the uterine ligament initiates from the superolateral aspect of the uterine body and passes within the inguinal canal and terminates in the labium majoris. The avarage length was observed to be 14 cm. (Fig.1,2).The ovarian ligament extended from the superolateral aspect of the uterine ligament, passing within the broad ligament to ovary. The avarage length was observed to be 2,5 cm. (Fig.1,2).

Histological sections taken from the mid-portions of both ligaments showed the general microscopic appearance of the ligaments. They consisted of an outer epithelial layer of simple squamous cells of the peritoneum. Beneath the epithelial layer the thickness of the loose connective tissue showed regional variations. Most internally muscle bundles were found (Fig.3). They were separated from each other by some amount of loose connective tissue.Bundles were organized into outer longitudinal and inner circular layers. Numerous nerve fibers and vessels were observed within this connective tissue. Nerve fibers were usually located close to the vessels (Fig. 4).

They were especially abundant in the ovarian ligament. General structure of the ligament showed histological alterations at the uterus-uterine ligament and ovarian ligament-ovarium junctions.

At the junction of the utero-uterine ligament no distinctions could be made between the ligament and the myometrium.

Muscle bundles of the ligament extended into the myometrium and became continuous with the myometrium of the uterus. Also great number of vessels from the ligament enter into the myometrium (Fig.5). At the ovarian ligament junction the two structures were clearly defined. The ligament blended with the loose connective tissue of the ovarian capsule by the way of sending septa into the tissue. The dense structure of the ovary and the loose connective tissue of the ligament were very distinctive (Fig.6).Towards the ovarian ligament-ovarium

junction the amount of muscle fibers and vessels reduced in number considerably.

DISCUSSION

This study confirms that the two ligaments do not have the structure of a true ligament.

They consist of smooth muscle fibers arranged into outer longitudinal and inner circular groups. Furthermore, the organized muscle fibers of the uterine ligament were continuous with the muscle fibers of the myometrium. Although the uterine and ovarian ligaments are regarded as two separate ligaments (1,2,3), this study suggests that they may form a single ligament extending between the labia majoris and the ovary.

The direct extension of the muscle fibers from the uterine ligament into the myometrium suggests that the function of the ligament may influence the function of the myometrium by way of an unknown mechanism.

Electron microscopic studies on the muscle cells of both ligaments showed regions of close approach between adjacent cells to 10-15 nm and were devoid of basal lamina (9,13). Two types of intercellular junctional complexes (close contact and intermediate junctions) were observed. They are thought to coordinate the muscle activity and synchronize contraction of the ligament. These contractions were active during ovulation (12). The structural importance and the vital location of the ligament confirms that they do not have a passive function, but may have on active function especially in the process of ovulation.

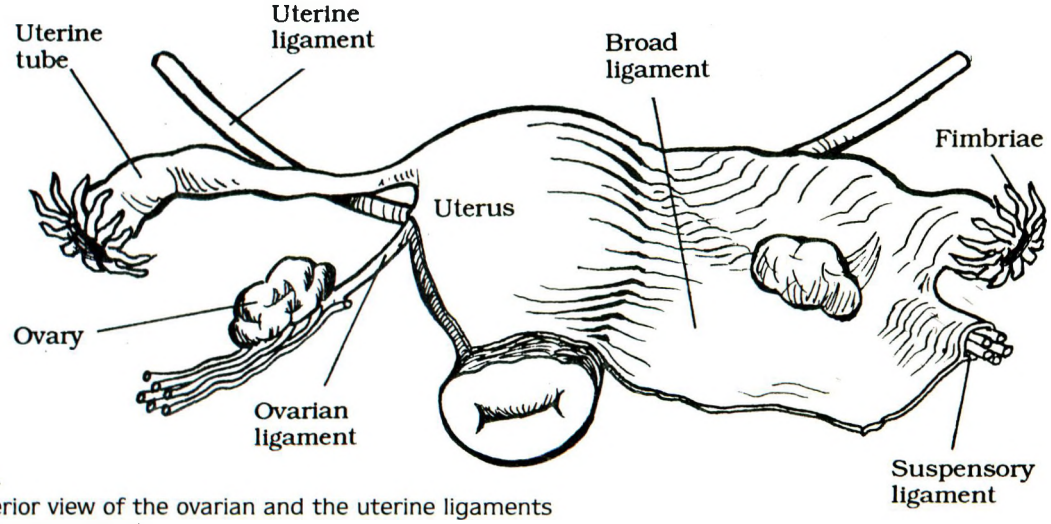

Fig. 1.
Posterior view of the ovarian and the uterine ligaments (from Grant Atlas).

Fig.2.
Gross anatomical view of the ligaments taken from a female cadaver, showing the close relations of the ligaments to the uterus, ovary, uterine tube.
(1.Uterine ligament; 2.Uterine tube; 3.Ovarian ligament; 4.Uterus)

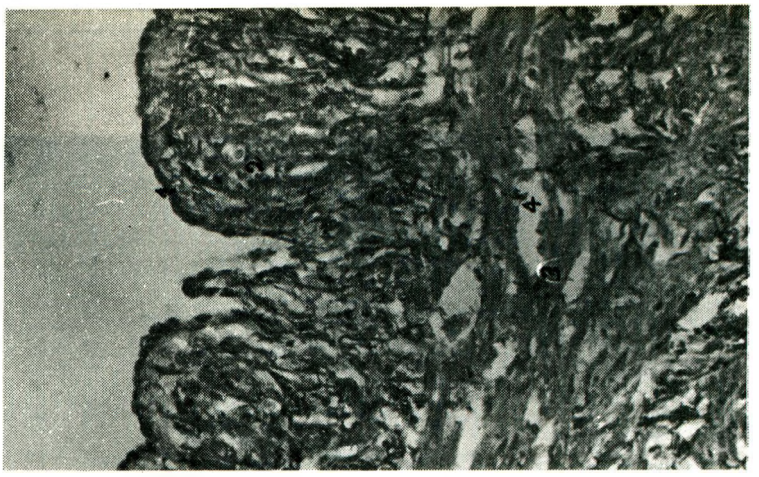

Fig. 3.
Light-microscopic view (x 100) from the mid-portions of both ligaments.
(1.Epithelial layer of simple squamous cells; 2.Loose connective tissue; 3.Muscle bundles; 4.Loose connective tissue seperating the muscle bundle from one another)

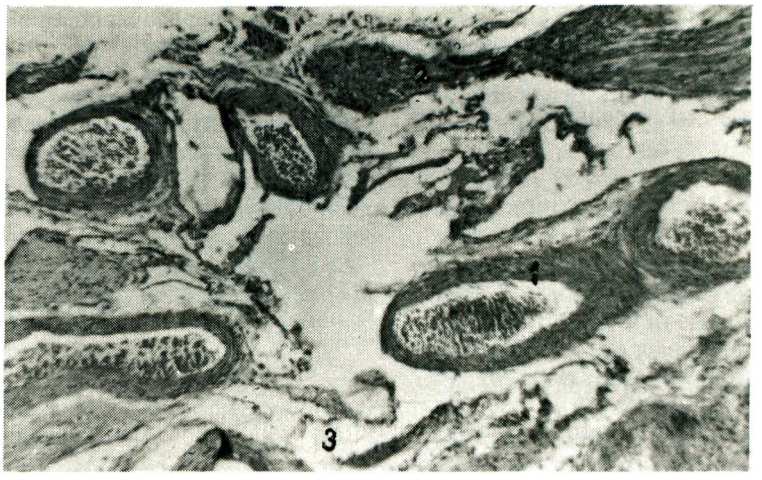

Fig. 4.
Light-microscopic view (x 100) of the numerous blood vessels and nerves within the connective tissue of the ligaments.(1.Blood vessels; 2.Nerve fibers; 3.Connective tissue)

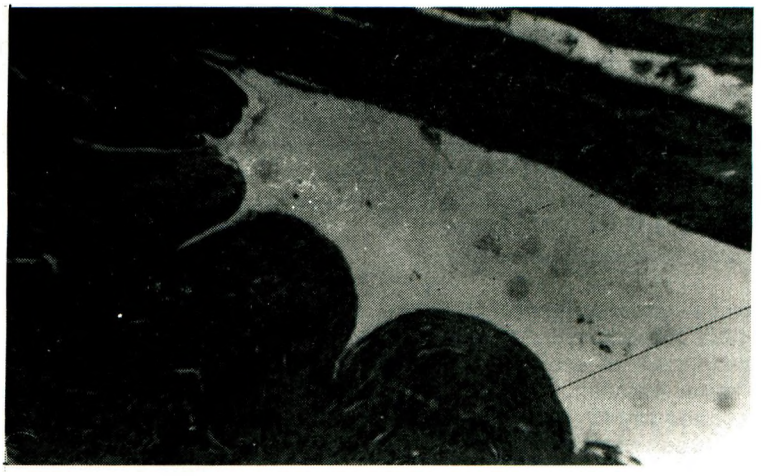

Fig. 5.
Microscopic view (x 40) at the uterine ligament-uterus junction show the continuation of the muscle fibers of uterine ligament into the myometrium.
(1.Uterine ligament; 2.Myometrium)

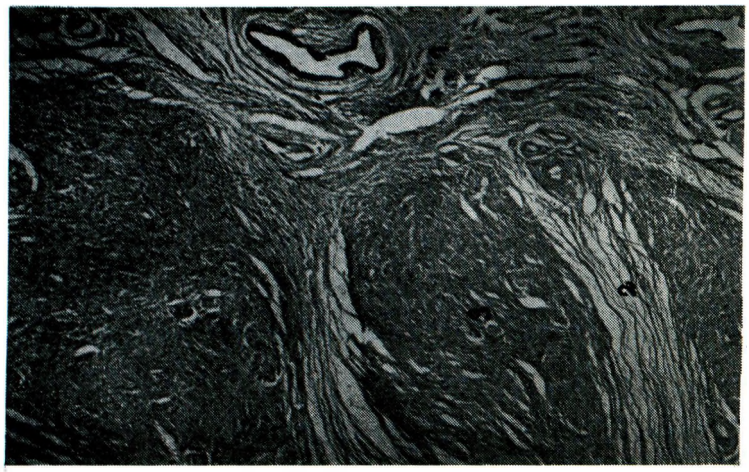

Fig. 6.
Microscopic view (x 100) of the ovarian ligament-ovary junction,showing the blending of the ovarian ligament with the ovarian capsule by way of sending septa into the structure of ovary.
(1.Ovarian ligament; 2.Septa; 3.Ovary)

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