

The Yabuki space: landmark in pelvic anatomy and surgery

Madalina Piron^{1,2}, Lucian Pop^{1,2}, Viorica Radoi^{1,2}, Nicolae Bacalbasa^{2,3}, Irina Balescu⁴, Ioan D. Suciu⁵

¹"Alessandrescu-Rusescu" National Institute of Mother and Child Care, Bucharest, Romania

²Department of Obstetrics and Gynecology, "Carol Davila" University of Medicine and Pharmacy, Bucharest, Romania

³Department of Visceral Surgery, Center of Excellence in Translational Medicine, Fundeni Clinical Institute, Bucharest, Romania

⁴Department of Visceral Surgery, Ponderas Academic Hospital, Bucharest, Romania

⁵General Surgery Department, Floreasca Emergency Hospital, Bucharest, Romania

ABSTRACT

Gynecological surgery, especially oncological surgery, is a daily challenge with an impressive development over time. The anatomy of the pelvis and its study have led to the development of new surgical techniques with the discovery of spaces and structures that bring considerable benefits to the postoperative result, both oncological and hemodynamic or functional. Radical nerve-sparing hysterectomy is a topical issue that significantly improves patients' quality of life.

Keywords: surgery, gynecology, anatomy, Yabuki

INTRODUCTION

The history of gynecological surgery has evolved based on anatomical findings. In 1895, Mackenrodt's transverse cervical ligament was a controversial discovery, with some considering it an extension of the parameter, and the cardinal ligament terminology was agreed upon [1,2]. In 1945, Wertheim and Meigs revolutionized cancer surgery [3].

The spaces are delimited, from the point of view of the clinical anatomy, by at least two fasciae and contain connective tissue [4,5]. Their exposure by separating the fascia leads to the creation of surgical cleavage spaces, but, from a surgical point of view, not all avascular spaces are delimited by two fasciae [4,6-7].

Laparoscopy in gynecology has led to the revelation of new spaces and dissection plans, and nerve-sparing procedures have been improved. The pararectal and paravesical spaces can be divided into medial or lateral spaces, and the total number of spaces varies between six and eight [4-9]. The spaces are avascular and contain fatty tissue and connective tissue being derived from different embryological structures. Knowing these spaces and accessing them prevents unnecessary blood loss, injury to the viscera and ureter [4,8-10].

The spaces of the pelvis are divided into lateral spaces and medial spaces, being named according to the nearest organ [4]. The lateral spaces are paravesical, pararectal and Yabuki's fourth space. The paravesical and pararectal spaces are in turn divided, by the umbilical artery, respectively the ureter, into lateral and medial spaces [4,11]. The medial spaces are represented by the Retzius space (retropubic), the rectovaginal, presacral or retrorectal, vesicovaginal or vesicocervical spaces [4,11].

THE YABUKI SPACE: DESCRIPTION

Yoshihiko Yabuki described the Yabuki space, also called the fourth space, in 2000. The delimitations of the Yabuki space are given by the bladder and ureter ligament, which contains the splanchnic nerves that intervene in the bladder, its dissection being possible by dissecting the cranial portion of the bladder-uterine ligament, having utility in nerve-sparing surgery [4].

Along with the Okabayashi, Latzko and medial paravesical spaces, the Yabuki space is one of the most important landmarks in the nerve-sparing techniques of gynecological oncological surgery [4, 12-13].

Corresponding author:

Dr. Madalina Piron

E-mail: dumitrascumadalinap@gmail.com

Article History:

Received: 18 April 2022

Accepted: 28 April 2022

The Yabuki space is located in the area of the ureter insertion into the bladder, and unlike the other pelvic spaces, it is not lined by the peritoneum, so this space is between the anterior face of the uterus and the entrance of the ureter into the bladder [14,15].

The cervicovesical fascia consists of an anterior and a posterior leaf and delimits the Yabuki space. The anterior sheet accompanies the ureter at the entrance to the bladder, and the covering of the ureter in the anterior sheet leads to the formation of bladder pillars. The posterior leaf of the cervicovesical fascia communicates at the levator level with the endopelvic fascia [7,15].

IMPORTANCE OF YABUKI SPACE

A retrospective study analysed 440 patients with IBI to IIB cervical cancer. Patients were divided into

two groups according to the chosen surgical method. The two methods approached were the traditional one and the one that uses anatomical landmarks. The blood loss and the ureteral injury were significantly lower in the anatomical space group [14].

CONCLUSION

Knowing the anatomical spaces of the pelvis are important both for operating comfort and for improving the quality of life of patients. The Yabuki space is a space of remarkable importance by preserving the bladder innervation and by the open approach of a space that provides important interoperative information for the orientation and preservation of tissues.

Conflict of interest: none declared

Financial support: none declared

REFERENCES

- Moritz M. On the nature of the so-called ligaments of Mackenrodt. *BJOG*. 1913;23:135–138.
- Eid S, Iwanaga J, Oskouian RJ et al. Comprehensive Review of the Cardinal Ligament. *Cureus*. 2018; 10(6):e2846.
- Yabuki Y. Twenty-first century radical hysterectomy - Journey from descriptive to practical anatomy. *Gynecol Oncol Rep*. 2020 Aug 19;34:100623.
- Kostov S, Slavchev S, Dzhenkov D et al. Avascular Spaces of the Female Pelvis-Clinical Applications in Obstetrics and Gynecology. *J Clin Med*. 2020 May 13;9(5):1460.
- Netter F. Atlas of Human Anatomy. 6th ed. Amsterdam, The Netherlands: Saunders/Elsevier, 2014.
- Ercoli A, Delmas V, Fanfani F et al. Terminologia Anatomica versus unofficial descriptions and nomenclature of the fasciae and ligaments of the female pelvis: A dissection-based comparative study. *Am. J. Obstet Gynecol*. 2005; 193:1565–1573.
- Yabuki Y, Sasaki H, Hatakeyama N, Murakami G. Discrepancies between classic anatomy and modern gynecologic surgery on pelvic connective tissue structure: Harmonization of those concepts by collaborative cadaver dissection. *Am J Obstet Gynecol*. 2005;193:7–15.
- Nezhat C, Nezhat F, Nezhat C. Nezhat's Operative Gynecologic Laparoscopy and Hysteroscopy. 3rd ed. New York, USA: Cambridge University Press, 2008;73–75.
- Selçuk İ, Ersak B, Tatar İ et al. Basic clinical retroperitoneal anatomy for pelvic surgeons. *Turk J Obstet Gynecol*. 2018; 15:259–69.
- Dietrich CS, Gehrich A, Bakaya S. Surgical, exposure and anatomy of the female pelvis. *Surg Clin N Am*. 2008; 88:223–243.
- Gomel V, Brill A. Reconstructive and Reproductive Surgery in Gynecology. London, UK: Infroma Healthcare. 2010; 40–45.
- Puntambekar S, Nanda SM, Parikh K. Laparoscopic Pelvic Anatomy in Females. Singapore: Springer Nature Singapore Pte Ltd., 2019
- Liang Z, Chen Y, Xu H et al. Laparoscopic nerve-sparing radical hysterectomy with fascia space dissection technique for cervical cancer: Description of technique and outcomes. *Gynecol Oncol*. 2010; 119:202–7.
- Wang J, Sun L, Ni T et al. A practical method of using the anatomical space of the vesicouterine ligament for laparoscopic radical hysterectomy: a retrospective cohort study. *J Int Med Res*. 2020 Jun;48(6):300060520926857.
- Puntambekar S, Manchanda R. Surgical pelvic anatomy in gynecologic oncology. *Int J Gynaecol Obstet*. 2018 Oct;143 Suppl 2:86-92.