

Gynecological Operative Anatomy

The Simple and Radical Hysterectomy Atlas

Appendix The Radioisotope Radical Operation

By

Eduard Gitsch and Adolf Hans Palmrich

Prefatory Words by

H. Husslein and I. Amreich

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Hans Lang † and Werner Sailer

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Prefatory remarks

The atlas presented herewith on the subject of gynecological operative anatomy fills the heretofore perceptible gap between anatomic text books and manuals of gynecological operations. In particular, the text books have failed to take into consideration the changes in topographic anatomy caused by traction in vaginal operations. In addition, most gynecological text books—except perhaps those of AMREICH and MARTIUS—pay too little attention to the altered anatomical details. Only one who specializes in the anatomy of the small pelvis and has sufficient surgical experience, especially in vaginal procedures, can properly depict the changes in anatomical details which occur during the operation. The two authors, GITSCH and PALMRICH, have succeeded outstandingly in accomplishing this task both verbally and pictorially.

This atlas is not intended to rival already existing text books of operative surgery, but it is a valuable

supplement and of special assistance to young surgeons in regard to anatomical difficulties. Through its precise descriptions, especially of the vaginal hysterectomy, this atlas should promote enthusiasm for vaginal surgery among gynecologists.

In describing WERTHEIM's operation proper emphasis is given to the advancements made by the Viennese gynecological school in further developing the original WERTHEIM method. Although the contributions of American authors are very worthwhile, the first steps towards further development were made by LATZKO in Vienna. This atlas, with its detailed presentation, attempts to demonstrate to gynecological surgeons how this operation has to be carried out in order to merit the term "radical operation" and satisfy the demands of treating cervical carcinoma.

H. HUSSLEIN

Foreword

The structure of the pelvic connective tissue is of crucial importance for major operations involving the removal of the entire genitalia in the small pelvis. This tissue is located between the pelvic organs and the muscles and bones of the pelvic wall. It encases the lymphatic extension routes of cervical carcinoma as well as the arteries and veins of the pelvic organs and, of particular importance, the ureter, which should be protected at all costs. A lesion of this organ diminishes the chances of recovery to a high degree. In order to prevent its being damaged, the ureter has to be dissected and often displaced far away from the area of operation, a manoeuvre which, however, is relatively dangerous and can even cause necroses of this important structure. Cutting out the pelvic connective tissue as radically as possible during an operation of carcinoma significantly improves the chances of recovering from this disease.

Two kinds of pelvic connective tissue can be clearly distinguished: 1. the taut connective tissue, which joins the fascia of the pelvic wall to the main vessels of the pelvic wall and fuses laterally into the cervix and the fornix vaginae. This strong connective tissue is anatomically termed *Ligamentum transversum colli*; in the surgical anatomy of the pelvis it is known as *ligamentum (cardinale) MACKENRODT*. It rises from the side of the cervix and both sides of the fornix vaginae and runs posteriorly and laterally to the right and left of the pelvic wall in the area of the foramen gluteum superius. In this way the cervix and fornix vaginae are held securely in position but still allowed a certain margin of mobility by the vessels, connective tissue, and fatty tissue on the lateral sides. They are further supported by the levator ani, should their excursions exceed the norm. This simply means limitation of the excursion of the genitalia to a degree that does not endanger the elasticity of the *ligamentum transversum colli* (*ligamentum cardinale*). Near the point of fusion of the *ligamentum transversum colli* on the cervix and the fornix vaginae the sagittal bladder pillars branch off

in the front towards the vesical fascia. In the back the sagittal rectal pillars pass along either side lying on the fascia of the pelvic wall and encircling the cul-de-sac subperitoneally. Thus the genitalia are safely guarded against dislocation while the bladder and rectum are held in place through sagittal emanations of the connective tissue in front and back. 2. The fine connective areolar tissue functions to connect the surfaces of the bladder and anterior wall of the cervix and vagina without impinging on the necessary mobility of these organs in relation to each other due to its looseness and elasticity. With correct preparation this loose areolar connective tissue can be severed by pressure with retractors. With slight pressure on this tissue displacement of the ureter is also possible when attempting to excise as much parametrium as possible in radical operations. Above all, however, the adventitia has to remain undamaged in order to keep the ureter intact. The connective tissue which covers the ureter contains anastomoses of all tiny vessels which the ureter intercepts during its course from the kidney to the bladder. Keeping this cover of the ureter intact is of utmost importance! There is less harm if one of the many minor branches of the renalis, spermatica, iliaca communis, hypogastric or uterine artery, or vesical caudal artery are damaged. The supplying of the genitale by spermatical vessels is simple as these are held together in one funicle (infundibulopelvic ligament) at first, and then proceed through the loose connective tissue of the mesosalpinx. There they can easily be found and ligated without much difficulty. In most cases, however, the whole infundibulopelvic ligament is ligated.

The mass of connective tissue and vessels (*ligamentum transversum colli*, i. e. *ligamentum cardinale*) must always be cut sharply because of its tautness and great tensile strength. Within the gaps and spaces of this connective tissue the blood and lymph vessels of the genitalia are embedded with the fat surrounding them. The place where this funicle containing the vessels should be cut can easily be found by probing

the delicate spider web-like connective tissue in front of and behind the utero-vaginal vessels pushing it close to the taut funicle of connective tissue with a cotton applicator. The delicate tissue tears without using force wherever slight pressure is applied. The vessels of the pelvic wall (including glutea caudalis) from which the vessels for uterus and vagina branch off can also be easily extirpated and left on the operative specimen. This example shows how precise knowledge of tissue anatomy not only facilitates and safeguards the operative procedure to a great extent, but also permits an exact ascertainment of the radicality of the operation. This is an important premise for comparing the successes of operative results. This anatomical procedure also has the advantage of offering the best protection to the neighboring organs and a higher probability of keeping their blood supply intact. Thus, on the one hand, maximum radicality of the operation, and on the other hand, protection of the syntopic organs prove the superiority of the anatomical procedure.

The organs of the small pelvis—rectum, uterus and bladder—often all share the characteristic of having the capacity to alter their volume substantially. Therefore the so called loose connective tissue located between the stronger funicles of connective tissue has a particular structure. The loose and spider web-like connective tissue envelops the subcutaneous fatty tissue which serves primarily to store liquids. If one neighboring organ is pressed against another this highly elastic fatty tissue is emptied of its storage of liquid, thus enabling the organs to adjust their orientation to each other. After termination of the

deforming process, the compressed fatty tissue and its spider web-like covering can quickly and easily return to their normal length due to their elasticity. This adjustment mechanism alters considerably during the stretching phase, which permits substantial shifting of the pelvic organs in relation to each other. The loose connective tissue and the fatty tissue display this structure first of all primarily in the paravesical fossa. The uterus is particularly mobile which is demonstrated in the vaginal and abdominal hysterectomy. The topographic changes caused by caudal or cranial traction form the basis of the descriptions and illustrations of the authors. In this way they have succeeded in bridging the gap between the two fields of anatomy and operative surgery. Faulty dissection can more easily be avoided if the surgeon has a good knowledge of the change in topography.

It gives me great pleasure that the authors of this atlas, both former students of mine in the Ob-Gyn. Department of the University of Vienna Medical School, are continuing to follow up my work in this field by giving operative surgery a firm anatomic foundation. Their productive efforts have been actualized by Dr. LANG's outstanding descriptive talent.

The authors of this well illustrated and valuable book also discuss the possibility of improving the results of an operation through additional measures. The effect of a lymphonodectomy can be demonstrated by means of a type I radioisotope radical operation (radioactive gold colloid).

I. AMREICH

Preface to the first english edition

Some corrections to the text and illustrations of the first German edition as well as the inclusion of additional illustrations were necessary. The new illustrations were produced in their final form by Mr. WERNER SAILER on the basis of his own observations.

Mrs. MARILYN LANGLOIS, native American and teacher of the English language, undertook the translation of the text in a most perceptive manner following a detailed study of the material.

Dr. ARTHUR KLINE and Dr. R. E. MAZZUCHELLI were consulted in regard to the didactic conception

and the gynecological terms. Mrs. BRIGITTE KLAAR and Mrs. E. ROHRHOFFER took on the laborious task of typing and correcting the manuscript.

We would like to express our gratitude to these additional collaborators as well as to the publisher, WALTER DE GRUYTER & Co., for the excellent format of this new edition.

E. GITSCH

A. H. PALMRICH

Preface to the first german edition

The study of operative anatomy closes the gap between the fields of topographic anatomy and operative surgery. In the field of gynecology there are very few extensive works dealing with this subject. These include the atlas by TANDLER-HALBAN "Die Topographie des Ureters (Mit besonderer Berücksichtigung der pathologischen Zustände und der gynäkologischen Operationen)" (The Topography of the Ureter, with Particular Attention to Pathological Conditions and Gynecological Operations), "Der gynäkologische Operationskursus" (Course in Surgical Gynecology) by W. LIEPMANN, as well as "Gynäkologische Operationslehre" (Gynecological Operative Surgery) by PEHMAN-AMREICH (now out of print). Although this standard work deals mainly with operative surgery, it contains a great deal of operative anatomy as well. In addition, "Die gynäkologischen Operationen und ihre topographischen Grundlagen" (Gynecological Operations and their Topographic Basis) by von H. MARTIUS, a textbook which has appeared in several editions, should be mentioned. The most recent edition was revised by H. HUSSLEIN.

We have given particular attention to textbooks of operative surgery and topographic anatomy as well as atlases and relevant publications which gave us much stimulation. These are listed in the bibliography. We have refrained from including a complete bibliography of all related fields.

It is our aim to continue AMREICH's work and to depict the anatomic changes which occur in each step of the operation as the genitalia are pulled upwards or downwards. In so doing, modern surgical methods have been taken into consideration. The descriptions and illustrations of the altered topographic anatomy should serve to supplement and clarify the individual technical steps of the operation as presented in most textbooks. This atlas is also intended to serve as an aid to students of operative surgery and thus as a basis for courses in this field.

We would like to express our particular gratitude to Dr. HANS LANG, anatomist and student of WEIBEL, former chairman of the 2nd Department of Obstetrics and Gynecology of the University of Vienna Medical School. His outstanding talent for pictorial representation, his insight and creativity were prerequisite for the compilation of this work.

As for the content itself, acknowledgement is due above all to our teachers. In listing their names we skirt the historical development which formed the basis for our work.

At the top of the list I. AMREICH must be mentioned. Both of the authors worked under his direction in both departments of gynecology at the University of Vienna medical school. He made it possible to expand the vaginal radical operation by structuring it more precisely anatomically, as did LATZKO for the abdominal radical operation. We owe him personal thanks for his advice and constructive criticism which furthered the completion of our work.

T. ANTOINE continued the tradition of the WERTHEIM school according to WEIBEL and WERNER, making it possible to modify the WERTHEIM operation with the mesurer preparation method. G. HALTER, L. KRAUL, S. TAPPER, and E. NAVRATIL followed up on the Schauta or Schauta-Amreich technique. The directors of the 2nd Department of Gynecology in Vienna, H. ZACHERL and H. HUSSLEIN, promoted the re-introduction of the expanded radical operation according to LATZKO. We were able to familiarize ourselves with the methods of MEIGS and OKABAYASHI and their variations on the basis of personal observations.

We would like to thank Mr. H. JANISCH and Mr. R. ULM for their assistance in the technical, histological, and photographic aspects involved in this work.

Mr. A. GISEL, assistant professor at the Institute for Anatomy of the University of Vienna, was our consultant in all anatomical questions, for which we are extremely grateful.

Mrs. E. v. ZALLINGER accurately corrected the text and the bibliography.

The publisher WALTER DE GRUYTER & Co. has promoted our work obligingly and with great interest. We would like to express our gratitude for

this as well as for the high quality of the format of this atlas.

E. GITSCH

A. H. PALMRICH

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Introduction

The operative anatomy of the vaginal and abdominal hysterectomy, the simple as well as the extended radical type, differs greatly from the normal topographic anatomy. The topographic relationship between the organs of the pelvis — uterus with adnexa, bladder, ureter, rectum, peritoneum (vesicouterine fold, cul-de-sac), connective tissue and pelvic muscles — is changed by pulling the genitals down or up, (fig. 1, 2, 3), and with every step of the

fresh cadavers had been fixed in different stages of operation with varying degrees of traction on the genitals both up and down. Transverse as well as sagittal sections had been performed. Through insertion of a ureteric catheter significant studies of the ureteric topography during these manipulations and during operations could be made (fig. 4, 5). A similar change of ureteric topography can be discerned in pyelograms of a re-positioned prolapse (fig. 6, 7).

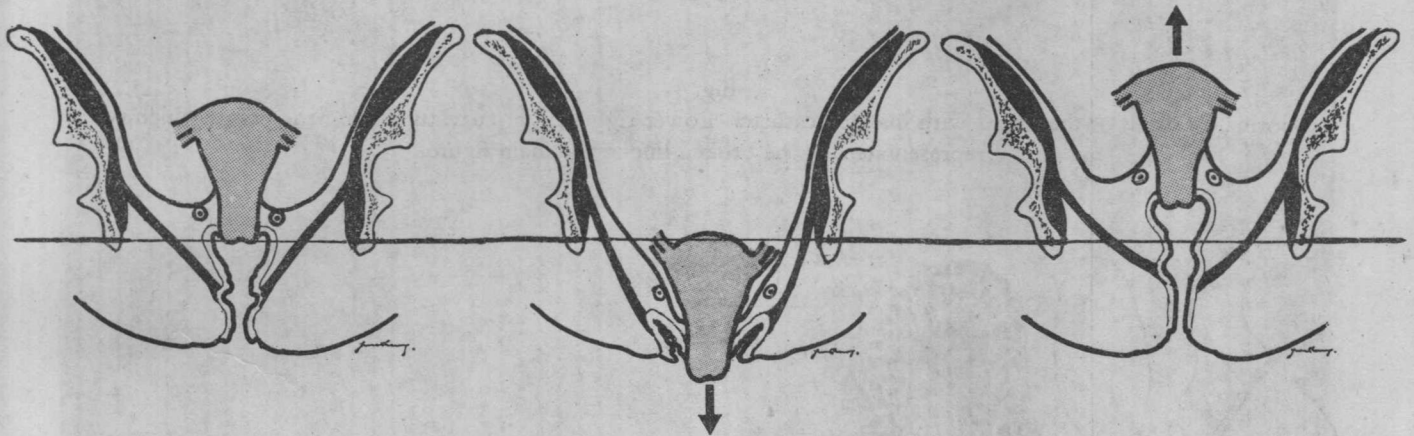


Fig. 1
Normal position of the uterus

Fig. 2
Traction on the cervix (during vaginal surgery)

Fig. 3
Traction on the corpus (during abdominal surgery)

operation (dissection of the bladder, cutting the parametria, etc.) the alteration is modified. This is especially true after previous operations and in cases involving severe pathological conditions.

All of these topographical changes have been studied, photographed and drawn during operations in vivo and on fresh corpses. In addition pelvises of

The most important steps of the different well-known operation methods (e. g. FREUND, CLARK, WERTHEIM, SCHUCHARDT, SCHAUTA, LATZKO, SCHIFFMANN, AMREICH, OKABAYASHI, STOECKEL, HEANEY, MEIGS and others) have been taken into consideration with regard to the changing topographic anatomy.

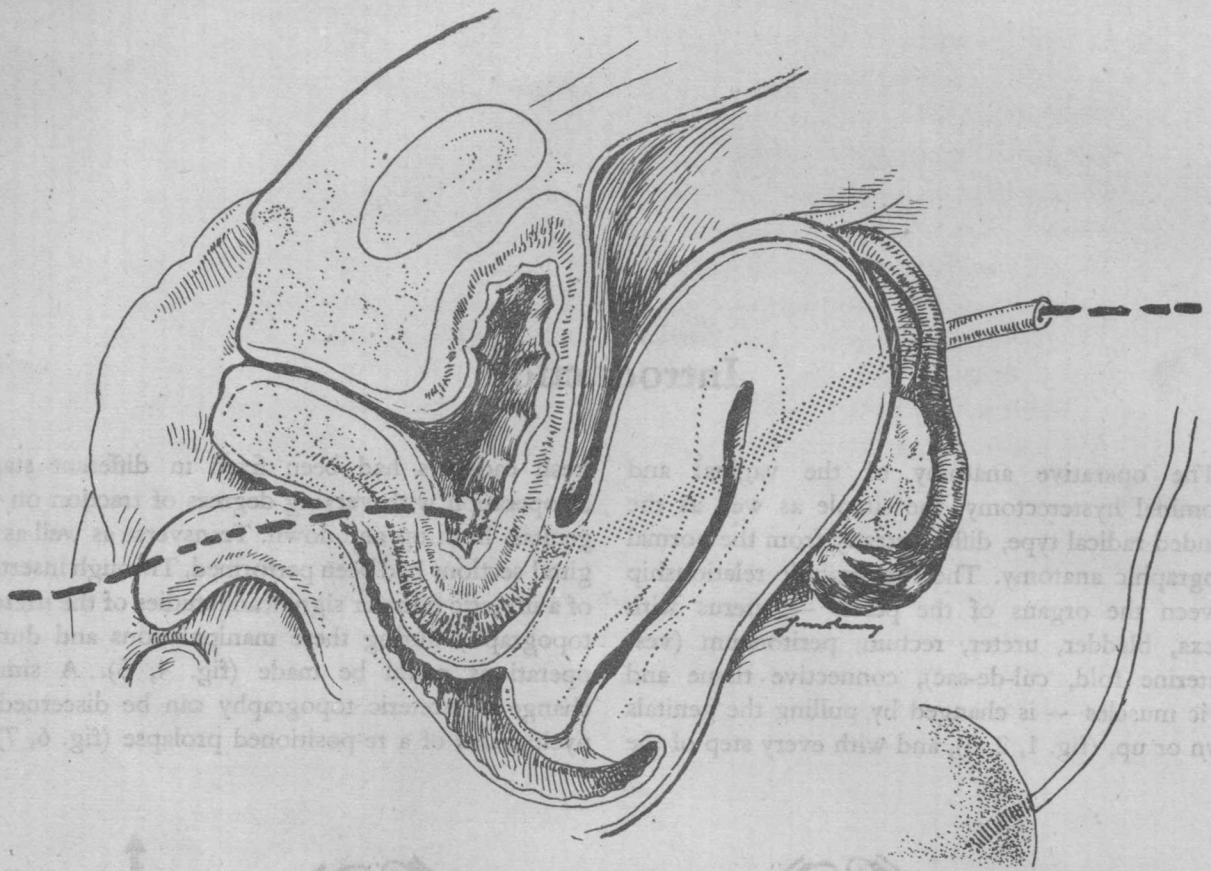


Fig. 4

Normal position of the ureter with inserted catheter. Lower right: slight curvature along the pelvis which is represented by the broken line in the main figure

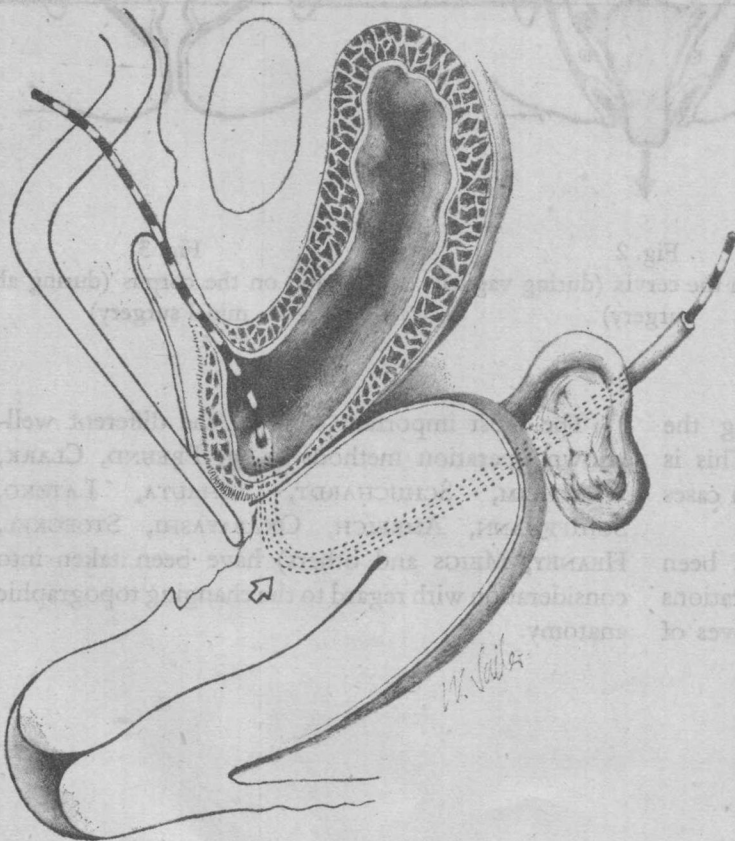


Fig. 5

After dissecting the bladder and pushing it back with a retractor, a knee of the ureter is formed (arrow)

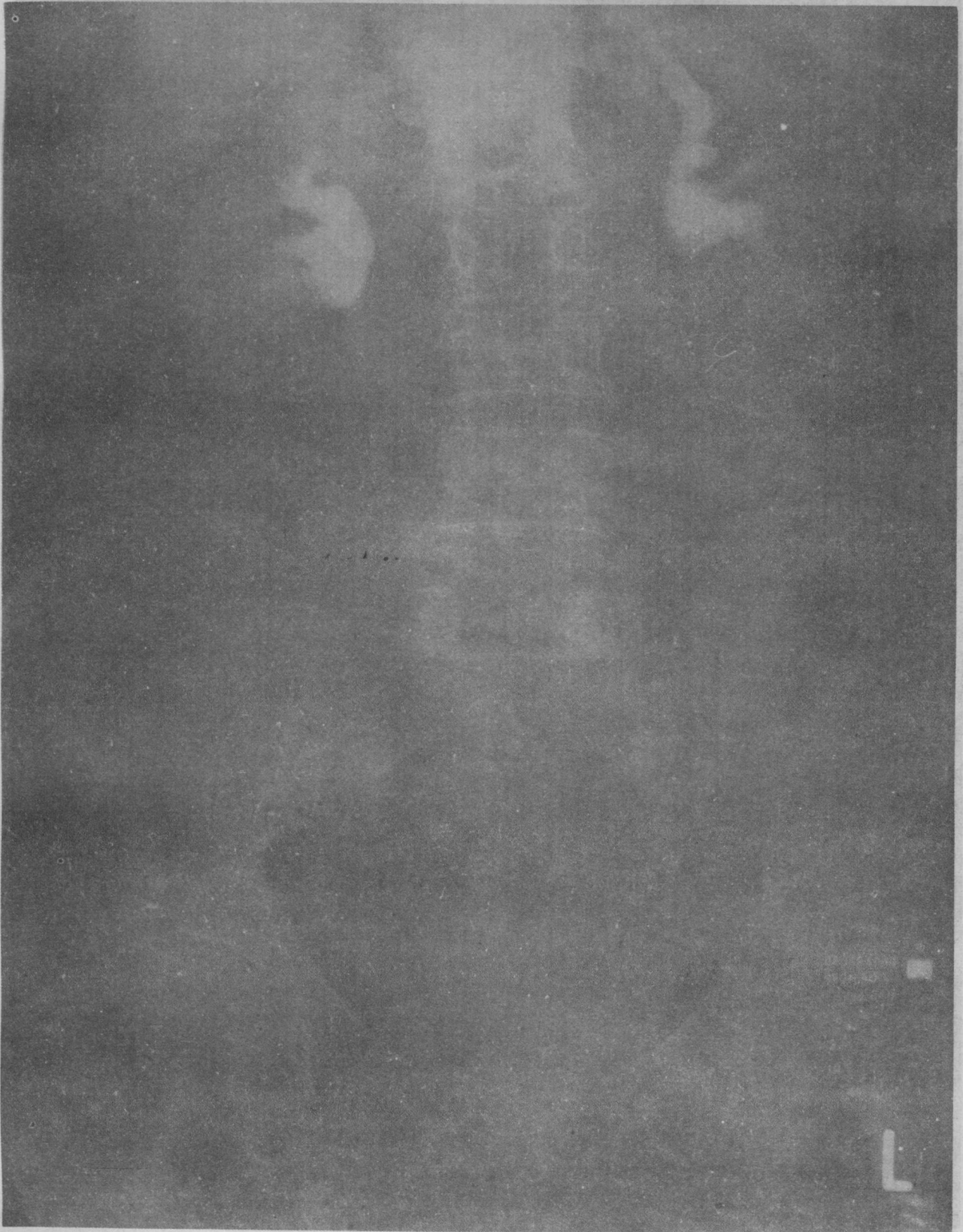


Fig. 6, 7

A ureteric knee can also be discerned in pyelograms of a re-positioned prolapse. (From a paper by G. WOLF and JANISCH, H., which will be published in „Der Radiologe“: „Veränderungen am Urogenital-System beim Genitalprolaps“)

Fig. 6

Infusion pyelogram in a case of prolapse. The ureter is extended and slightly curved

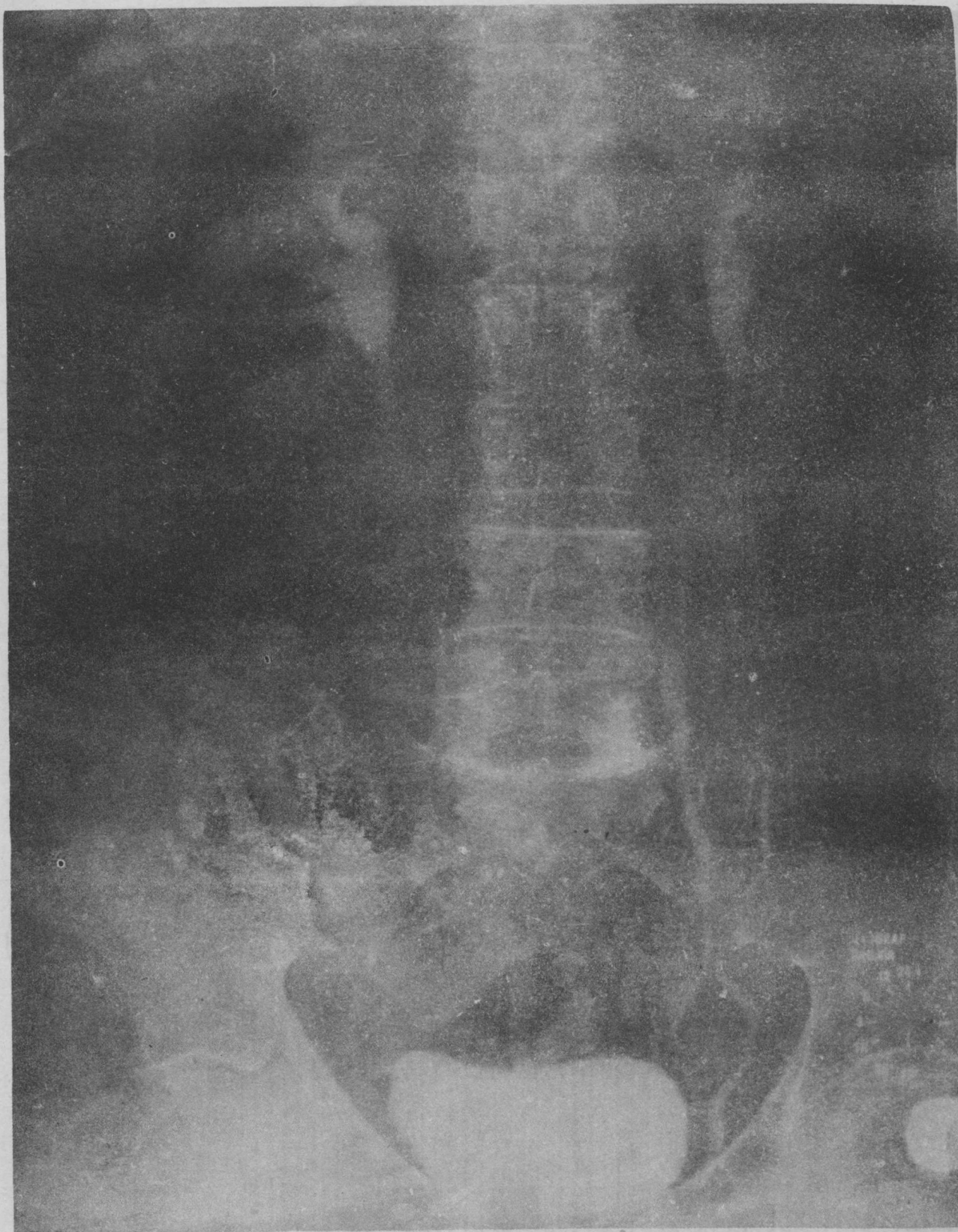


Fig. 7

After reposition of the prolapse, the ureter takes on a snake-like course and forms a loop before entering the bladder. The change is similar to that which occurs after dissection of the bladder in a vaginal hysterectomy or Schauta operation

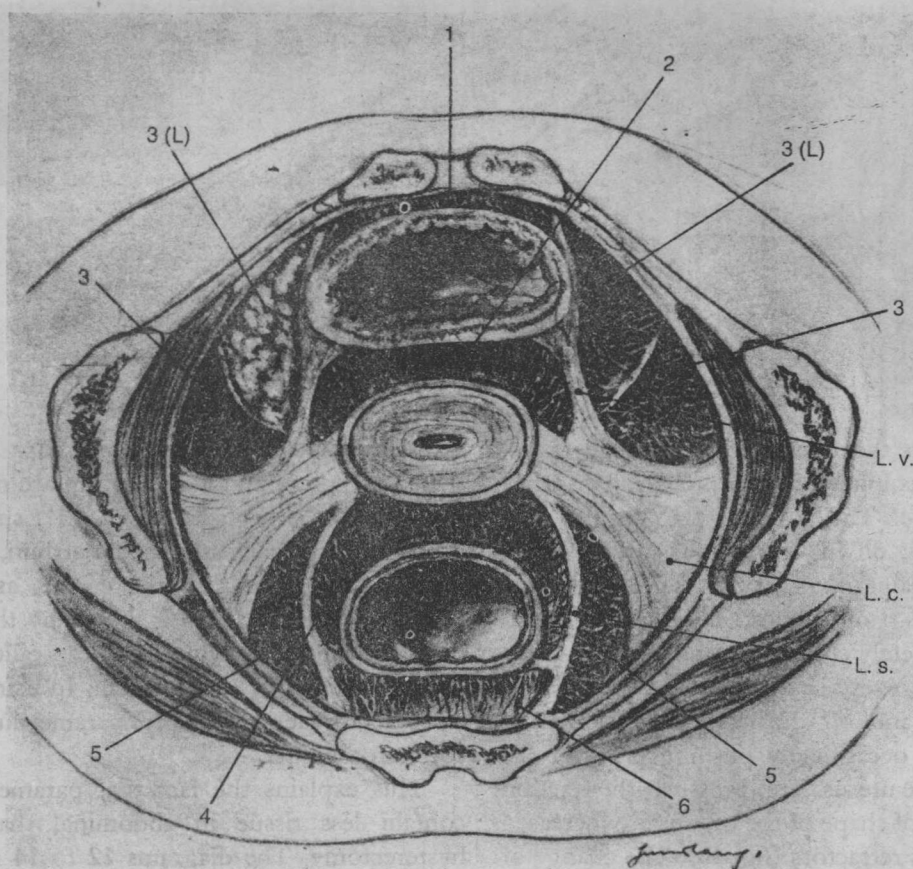


Fig. 8

The spaces of connective tissue between the ligamentary structures are enlarged for didactic purposes

- | | | |
|--|--|---|
| 1. prevesical space | ligament (ligamentum teres uteri). The front part contains fatty tissue with relatively large lobes. This is called fossa LATZKO | 5. pararectal space |
| 2. vesicocervical space | | 6. retrorectal space |
| 3. paravesical space: It is divided into 2 parts, mostly separated by a very fine membrane which joins the round | 4. rectocervical space | L. v. = vesicouterine ligament |
| | | L. c. = cardinal ligament (ligamentum transversum, web) |
| | | L. s. = uterosacral ligament |

We owe the basis of the vaginal operative anatomy to AMREICH, the former chairman of both gynecology departments of the University of Vienna.

In each chapter the dangers and mistakes in preparation as well as the variations effected by pathological conditions are discussed.

Special references are made to the finer anatomy — illustrated by slightly magnified and microscopical sections —, particularly to the delicate areolar spider-web-like connective tissue which is situated between

the adventitiae of all movable organs of the small pelvis (fig. 8). Only in this layer is a dissection without hemorrhage possible. When the fibers of this fine tissue are stretched up to a few millimeters by fine toothed tissue forceps they can be cut in the middle. This has to be stated here as it is valid for all types of pelvic surgery in the true pelvis.

As far as the nomenclature is concerned we generally used the common clinical terms and put the anatomical expressions in parentheses.

Vaginal hysterectomy

By traction on the cervix the paratissue (parametrium and paracolpium) is also pulled down, thus changing its shape. The parts of the vaginal wall which are pulled down form the surface of a cone which contains the cervix flanked by the parametrium and paracolpium, these being compressed and completely changed in shape (fig. 9—11). The vaginal wall exerts pressure on parts of the bladder in front and on the cul-de-sac (pouch of Douglas) behind, occasionally pushing parts of the rectum towards the uterus. This pressure, the traction and the alteration of shape of the organs are increased by the insertion of retractors (fig. 14). The change of topography becomes even more complicated in the following situations if not all connections to the organs have been already cut. For example, if the

bladder is already separated and slips upwards, but the paracolpium and parametrium are not yet ligated or cut. The illustrations 9 to 11 show how the paratissue, medially the parametrium, laterally the paracolpium, surrounds the cervix, as the traction is gradually increased. As shown by the dots in the diagram, the tissue tied with the so-called parametrial ligatures is mainly paracolpium. In using the expression paratissue, we imply parametrium and paracolpium together.

This explains the fact that parametrial ligatures contain less tissue in abdominal than in vaginal hysterectomy. The diagrams 12 to 14 illustrate how the vesicovaginal and vesicocervical spaces are changed by increasing traction on the cervix.

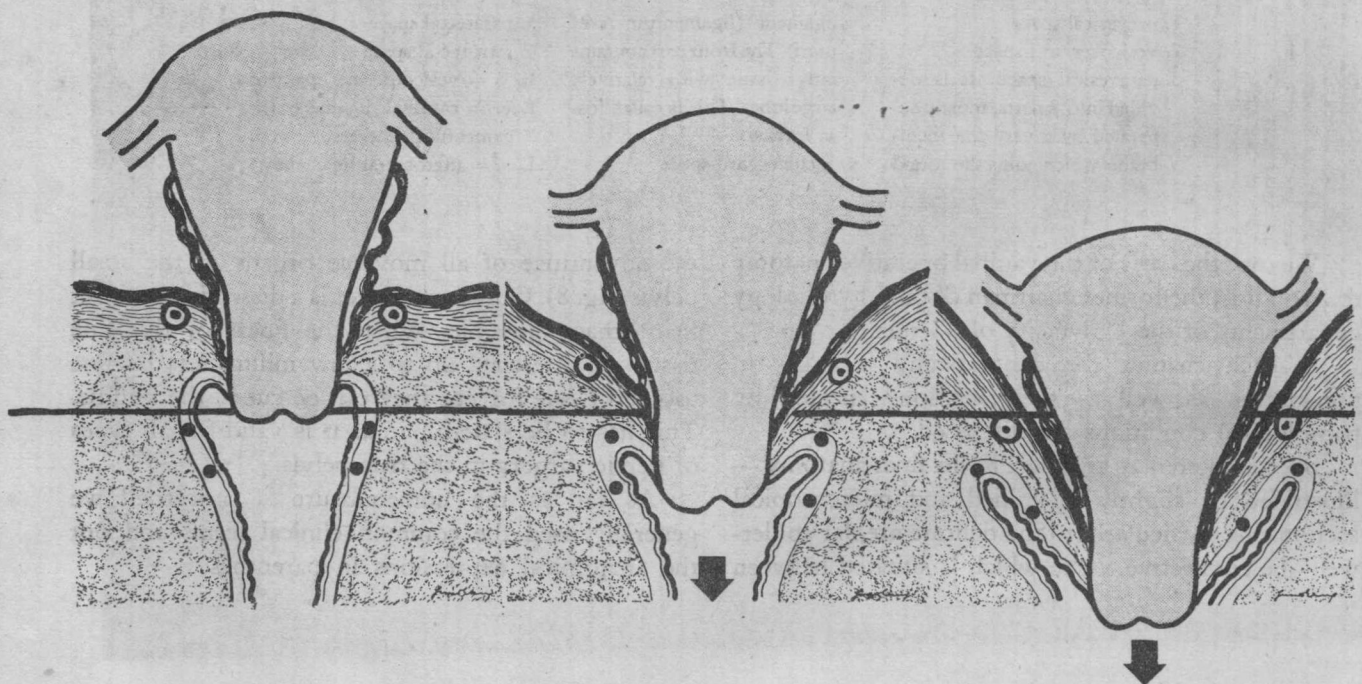


Fig. 9

Fig. 10

Fig. 11

Fig. 9, 10, 11

The fixed red and black points on either side of the vagina below the cervix illustrate how the vagina, paracolpium and parametrium are deformed into a kind of a cone through slight (fig. 10) and strong (fig. 11) traction on the cervix.

It can also be seen how the uterine artery develops a loop medially to the ureter