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Clinical practice of minimally invasive surgery in gynecological treatments

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Abstract
The medical world is facing increasing demands for improvement of the quality of life of women of all ages. This is not possible without overall improvement of the healthcare of females, and, in particular, of the quality of surgical treatment for gynecologic pathology. Positive changes are ensured by the active introduction of minimally invasive technologies into all spheres of gynecologic practices. There are almost no medical, demographic or technical limits for the application of endoscopy in gynecology, while the benefits it provides are extraordinary. Present research study clinically analysis the risk and other factors associated with minimally invasive surgery in gynecological treatments. The process of positive change towards minimally invasive surgery in operative gynecology should be supported and promoted by the medical community in every possible way.

Keywords: gynecologic surgery; minimally invasive surgery; endoscopy; laparoscopy; hysteroscopy; hysteroresectoscopy

Introduction
Life in the last several decades has been marked by an increasing incidence of tumors, hyperplastic processes, and anomalies of female genitalia, associated with ecologic deterioration and stress. The aging of the female population worldwide requires a revision of the approaches to surgical treatment of geriatric patients, particularly for complex correction of pelvic organ disorders (stress urinary incontinence, pelvic floor relaxation and uterine prolapse). At the same time, obstetric and pediatric patients with gynecologic diseases also require very special and delicate care.

In surgical gynecology, improvement of care followed the active introduction of innovative methods of examination (magnetic resonance imaging, spiral computer tomography), minimally invasive techniques (laparoscopy, hysteroscopy) and technologies based on application of different energies (lasers, ultrasound, cryo, radiowave, electroenergy and plasma). More to the point, the concept of 'minimal invasiveness' in surgery means: firstly, minimal trauma gaining access to the pathologic process requiring elimination or correction; secondly, minimal intervention within the intraperitoneal environment; and, finally, preservation or restoration of normal (or as close to normal as possible) anatomic–topographic relations of pelvic structures (in radical surgery— minimization or compensation for the removal of the organ).

Different and sometimes quite opposite approaches to surgical treatment of gynecologic pathology have led to many questions. Particularly, questions regarding the advisability of conservative therapy versus surgery and special operative techniques for uterine myoma, ovarian cysts and tumors, endometriosis, tubal conditions, genital anomalies and prolapse are constantly being discussed. The opinions concerning the advisability and economic effects of the application of new technologies, energies, barriers, adjuvant and suture materials, peritonization, and drainage, remain controversial, however.

Adhesions formation is one of the serious adverse effects of any surgical intervention. Indeed, it may eliminate the expected positive outcome. The main trigger factors for the adhesive process—desiccation of the peritoneum, ischemia, exposure of the peritoneal cavity to the external environment and foreign bodies—are aspects of all surgical procedures performed by laparotomy [1].

Trauma reducing technologies
Modern technologies permit many types of surgery to be accomplished in a minimally traumatic manner. During the last decade, new technologies have appeared for the safe delivery of different energies to pathologic tissues for removal or destruction. Monopolar and bipolar electric currents are presently the energies being most widely used; however, they are not absolutely safe nor free from some specific disadvantages, such as smoke in the operative field, contamination of the instruments, or the need for special distention media. In this regard, other techniques based on the application of high and low temperature energies are being perfected. Cryosurgery is already successfully used for treatment of pathology of the uterine cervix, vagina, endometrium, but it is rarely applied in the abdominal cavity. Perspectives for the application of high-temperature thermal energy are based on known systems for intrauterine application and a minimally invasive technique of thermo ablation of the endometrium. The introduction of laser technologies revolutionized this field of medicine. The combination of the cutting and hemostatic properties of lasers was useful for many surgical interventions, including laparoscopy and hysteroscopy, in order to improve their effectiveness and safety. However, application of surgical lasers (CO_2, argon, KTP, Nd-YAG) is limited by several disadvantages, such as high cost and the necessity for special training. Positive and negative aspects of instruments based on the application of ultrasonics (harmonic scalpel and scissors) and microwaves (endometrial ablation) are already studied. Comparative experimental and clinical study of surgical energies and their effects on human tissues (depth of trauma and necrosis,

terms and adequacy of the reparative processes, adhesion formation) shows that both conventional and newer instruments (argon-enhanced coagulation, radio wave knife, ultrasonic scalpel) ensure a precise incision, controlled depth of trauma, adequate hemostasis, rapid and efficient wound healing, as well as reduction in the need for suturing. The types of suture materials has significantly increased due to the presence of non-reactive synthetic threads and new organic fibers, providing the support of tissue in course of wound healing, being absorbed in optimal terms (or non-absorbed), and having a chemical structure which is beneficial for the wound healing.

A number of investigations on Interceded (we have applied this product in 370 experimental animal models and in 186 patients) demonstrated a high efficacy of this barrier both for the reduction of adhesions, and for more adequate tissue regeneration the operated organ [2]. Application of the synthetic mesh, Surgicel, seems advisable for hemostasis during myomectomy (the mesh is placed in the myoma bed), and in surgery for severe endometriosis (for hemostasis of the ovarian endometrioma bed and the area of excised infiltrative endometriosis). Rational use of synthetic barriers, glues, modern suture materials and surgical energies, depending on the clinical situa tion and acknowledging the advantages and disadvantages of each agent, can ensure as much as a two-fold reduction of pelvic adhesions.

Photomedicine of the female genital system, aimed at the selective destruction of pathologic tissues, is based on the inter-relation of the light and light-sensitive preparations cumulated in the reproductive organs [3]. A search for a highly specific photosensibilizor and the optimal regimen of its delivery and activation is currently underway. Photodynamic therapy promises to become the gold standard of minimally invasive treatment.

Endoscopy

It is difficult to imagine any aspect of care for a gynecologic patient today—examination, surgical correction, monitoring of treatment efficacy— without endoscopy. The endoscopic approach is of vital importance for the differential diagnosis of gynecologic diseases, especially in unclear clinical situations where other methods fail to reveal either the true diagnosis or extent of the pathology: e.g. pelvic pain, adhesions, infertility, endometriosis [4]. Laparoscopy and hysteroscopy, undoubtedly can and must be used either as the main approach for an adequate surgical procedure, or as an assisting technique, thus facilitating, supplementing and providing safety of the main procedure. Indeed, it has been suggested that endoscopy become the approach of choice to all gynecologic conditions [5] because of its acknowledged advantages— minimal trauma, superb visualization, low incidence of complications, reduction of adhesions formation by at least 20% [6], and favorable postoperative course along with rapid recovery and cosmetic effect. In spite of the truth of this statement, many questions are still not solved.

Laparoscopy and pathology of adnexa

The major points of discussion concerning ovarian cysts and benign tumors surround the possibility and duration of observation of patients with ovarian cysts; the operative approach to large ovarian masses; the specific endoscopic technique of removal (puncture and opening of a cyst, use of special containers for specimen evacuation); and age and other limiting factors for endoscopic surgery. We consider laparoscopic surgery the operation of choice for ovarian tumors and cysts, inflammatory adnexal mass, tuboplasty, emergent adnexal conditions (tubal pregnancy, adnexal torsion, ovarian apoplexy, purulent adnexal mass or abscess). Laparoscopy is contraindicated, however, in gravely ill patients, and if malignancy is strongly suspected basing on ultrasonography or other imaging techniques, or oncoantigens testing. Any ovarian mass (except for a hyper stimulated ovary) is the indication for operative treatment, preferably by laparoscopy [7]. To prevent contamination of the abdominal cavity with tumor tissue, the mass should be removed entirely through a colpotomy aperture or an abdominal port in a special container. Large cysts in young women should be punctured, the contents aspirated, and the cystic cavity washed and examined under optic magnification. When indicated, the entire ovary may be removed; if not, the tumor or cystic capsula is removed by peeling. Intraoperative histopathology is advisable. The bed of a mass, if not bleeding severely, does not need suturing. Fibrin glue may be used to close the wound and for hemostasis. Large defects may be covered with Surgicel. If Interceed is available it may be placed around the ovary for prevention of peritubal adhesions.

Chronic inflammation of the uterine tubes and associated infertility is presently being discussed in terms of the criteria for patient selection for reconstructive tubal surgery with regard to the patient's age, extent and localization of damage, advisability of use of novel energies, dextrans, etc [8]. Tubal infertility can be corrected, except for the cases of total impatency. The chance for pregnancy after endoscopic tubal surgery, substantiated by our experience of more than 4300 procedures, is comparable with that provided by microsurgery using laparotomy or assisted reproductive technologies. Management of infertility from polycystic ovaries is variable concerning the choice of treatment modality, and, particularly, of the surgical technique. The decision to perform surgery should be substantiated by the data obtained in the course of endocrinologic testing and ineffective stimulation of ovulation. The laparoscopic approach is no doubt preferable, but there is no unanimity concerning the operative technique: deep wedge resection, alternative electro cauterization, or laser and argon beam coagulation after biopsy. The advocates of each method refer to higher pregnancy rates, but significant advantages have never been demonstrated for any technique.

Surgery by laparoscopy is possible in patients with purulent adnexal masses only in the hands of skilled surgeons and in association with wide spectrum antibiotic therapy. The volume of surgery should respect the severity of the pathologic process as well as patients characteristics (age, reproductive function) operations include: adhesiolysis, ovarian resection, adnexectomy, hysterectomy [9].

Therapy for tubal pregnancy is a continuing debate wherein the advisability of medical therapy, operative access and size are discussed [10-11]. Endoscopic tubotomy or tubectomy, respecting the extent of tubal destruction, appears to be the most effective operation for this condition, while the indications for laparotomy are determined by the physical status of the patient, and by an absence of the conditions necessary for successful performance of laparoscopy (personnel, equipment). Comparative analysis of operations performed by laparotomy and laparoscopy

provides evidence of the high effectiveness of the latter approach for restoration of tubal patency and chance of further uterine pregnancy. As for methotrexate therapy, its effectiveness is high, and its major advantage is absolute absence of trauma. However, lack of the sufficient worldwide experience does not allow one to say that this method should be the 'gold standard'. At the same time surgical correction eliminates any risk of chorion persistence.

Laparoscopic approach to uterine myoma

Problematic aspects of uterine myoma include: indications for surgery; hormonal pretreatment; operative approach: laparotomy–laparoscopy– resectoscopy; operative volume: myomectomy versus subtotal hysterectomy versus total hysterectomy; radical surgery with removal of uterine tubes and ovaries. Patients with asymptomatic myomas do not require surgical treatment and can choose observation or hormonal treatment. The number and location of the fibroids (except for submucous, pedunculated subserous, intraligamentary, cervical) and uterine size not exceeding 12 gestational weeks, are not independent indications for surgery. Women of reproductive age wanting to become pregnant should be allowed to conceive. Operative treatment of myoma-associated infertility is recommended with the patient's informed consent, because the success, including preservation of the uterus and non-formation of adhesions can never be guaranteed. When other important indications are present, such as bleeding, myoma growth, pelvic pain, urodynamic or other disturbances, surgery should be carried out to an extent agreed with the patient. Age is not a limiting factor for myomectomy.

Our experience of over 1700 laparoscopic myomectomies performed during the last 5 years, together with the experience of the other researchers, makes us consider laparoscopy the approach of choice for myomectomy, including large fibroids [12]. The main advantage of laparoscopic myomectomy is minimal adhesion formation if adequate suture material, surgical energies (argonenhanced, laser, ultrasonic) and barriers are used. The crucial aspect of laparoscopic myomectomy and the requisite for functional validity of the uterus, as in open surgery, is a layer-by-layer reconstruction of the uterine wall. Fibroids, preliminarily morcellated, are removed through an ancillary port or through a colpotomy aperture. Hysteroresectoscopy provides unique opportunities for removal of submucous fibroids. More important, hysteroscopy should be acknowledged the method of choice for the submucous myoma, being almost absolutely atraumatic, and almost totally eliminating any possible negative consequences of a scar on the uterus.

Hormonal pretreatment (mainly with GnRH agonists) is actively discussed in terms of the positive effect on fibroid size and blood supply reduction to facilitate surgery and minimize blood loss, as well as for induction of amenorrhea, which is of special value in anemic patients. Disadvantages of this therapy, besides the high cost of the preparations, include adverse effects, masking of minor fibroids and delay of surgery. The analysis of long-term results after endoscopic myomectomy shows rates of myoma recurrence and of scar insufficiency no higher than after an open procedure, so that the arguments in favor of laparotomy, in terms of access, providing identification of the largest number of fibroids and more adequate reconstruction of the uterus, appear groundless.

Laparoscopic hysterectomy

Since 1989, total laparoscopic hysterectomy has been introduced for treatment of uterine pathology. This procedure appears to be a real alternative of hysterectomy by laparotomy, exceeding the latter by a number of criteria, and worthy of becoming a routine intervention [13]. Having performed more than a thousand total laparoscopic hysterectomies, our team prefers the intrafascial technique as the most safe and simple. Our experience shows that none of the following factors—uterine size, unfavorable localization of the fibroids, associated pathology, previous surgeries—limits performance of this operation in the hands of a skilled surgeon. In hysterectomy, removal of the cervix is indicated by the presence of any cervical disease or background process. As demonstrated by most of investigations, a more radical operative volume of hysterectomy does not negatively affect the woman's health and quality of life after surgery. On the contrary, prophylactic removal of adnexa is not advisable and should be substantiated by the presence of a pathologic condition. Diagnostic laparoscopy or laparoscopic assistance during vaginal hysterectomy not only provides visualization of the real anatomic picture in the abdominal cavity, but allows the surgeon to perform correction of associated pathology and some steps of the hysterectomy itself, thus reducing the operating risk of this, to a certain degree 'blind', intervention [14].

Minimally invasive treatment of endometrial hyperplasia

Also subject to debate is the selection of patients with hyperplastic and precancerous conditions of the endometrium for medical therapy, its advisability, duration, and the criteria for conversion to more aggressive tactics and operative volume. This intrauterine pathology is often treated with medical preparations (hormonal, anti-inflammatory) after curettage; however, the value of this strategy is arguable because of the high rates of recurrence. One promising minimally invasive technique for the management of uterine bleeding caused by recurrent endometrial hyperplasia, is destruction of the endometrium by resection or ablation [15]. This can be accomplished by the electric loop or roller-ball, Nd:YAG laser, special balloons filled with fluid and containing a heater (ThermaChoice, Cavaterm, ELITE, NovaSure, GyneLase systems). Each of these latter methods has its own advantages and disadvantages connected with the necessity of distending the uterine cavity, possible cavity deformation, incomplete visualization, impossibility to treat the tubal cornua, and, finally, the lack of control of the depth of the energy effect. We consider hysteroresection of the endometrium with the electric loop to be the most reliable technique, because it provides information on the histologic characteristics of endometrium, removal of the tissue within a prescribed depth, and coagulation of bleeding sites. The obligatory condition for intrauterine surgery for endometrial pathology is the preliminary exclusion of hyperplastic and other pathologic conditions of the ovaries.

Laparoscopic management of pelvic floor disorders

The search for minimally invasive surgical approaches for the correction of uterine prolapse and pelvic floor

relaxation, especially in young women, became more intensive in recent years. The main principle of treatment is restoration or correction of the anatomy and function of all involved structures: ligamentary apparatus, pelvic floor muscles, and urinary incontinence. Laparoscopic techniques are now used actively, either as original methods of treatment, or combined with conventional vaginal access [16-17]. Our group has performed approximately 300 operations including various laparoscopic techniques of shortening and reinforcing of the uterine ligaments. We consider the following to be the most effective and physiologic: the technique of cross-formed shortening of round ligaments with fixation to the utero-sacral ligaments, shortening of the utero sacral ligaments, reduction of the peritoneum of the pouch of Douglas according to McCall, along with simultaneous restoration of all pelvic floor defects by vaginal access. This latter method is of special value in young patients willing to preserve reproductive function. The most widely practiced operation for uterine prolapse is vaginal hysterectomy with correction of cystocele, urethrocele, enterocele, and rectocele. However, in cases with a large uterus, concomitant gynecologic disease, and urinary stress incontinence, it seems more rational to perform laparoscopic hysterectomy combined with a McCall or Burch procedure. In the presence of genital hernia after hysterectomy, fixation of the vaginal stump to the sacral promontory with dura mater or synthetic mesh accompanied by myorrhaphy appears effective. Along with conventional vaginal procedures according to the Figurnov and Nichols techniques, alternative approaches to correction of urinary stress incontinence, such as Burch type laparoscopic procedures, correction with free tapes (TVT or transobturator technique—TOT), are now being studied. The latter procedures seem especially advantageous, as they are minimally invasive and can be carried out under local anesthesia, a feature of great importance in elderly patients [18].

Current treatment of endometriosis

Laparoscopy is acknowledged as the most precise method for the diagnosis of endometriosis. More than 20 types of peritoneal lesions have been described [19-20]. The accuracy of laparoscopy for the diagnosis of ovarian endometriomas reaches 98–100%. Only laparoscopy is able to reveal a complete or partial obliteration of the posterior pouch of Douglas with immobilization by adhesions or infiltration of the rectum or sigmoid colon, as well as deep infiltrative endometriotic involvement of the recto-vaginal septum, distal ureters, isthmus and utero-sacral ligaments, or parametrial area. Laparoscopy also demonstrates a typical visual appearance of the adenomyotic uterus, characterized by a specific 'pale marble' coloration of the serosa, sphere shape and uniform enlargement, or, in the case of local or nodular adenomyosis, a pronounced thickening of the anterior or posterior wall or its deformation by the nodule. In contrast, the effectiveness of hysteroscopic diagnosis of adenomyosis is very doubtful, because of the subjectivity of visual criteria, while the sign thought to be pathognomatic—i.e. the gaping of endometriotic 'passages' with hemorrhagic discharge— is only very rarely seen. Some authors perform a hysteroscopic biopsy of the myometrium to confirm the diagnosis.

In the past few years, laparoscopy has become the main approach for removal of endometriosis [21]. Having performed over varied range of laparoscopic or laparoscopic– vaginal procedures for this condition, author herself strongly believe that the anatomic substrate of endometriosis can be radically eliminated by no other method than surgery. However, the priority of any method of treatment, sequence, advisability of preoperative and postoperative hormonal therapy, volume of surgery, selection of energy for lesion destruction, are questions which remain open for discussion. Surgical treatment is not always acceptable to the patient. In such cases, empiric medical treatment of minimal and moderate endometriosis (or, more precisely, of symptoms probably caused by endometriosis) provides an alternative. Among the positive effects of empiric hormonal therapy are the reduction of implant size and infiltration and vascularization in the lesion. Medical treatment of ovarian endometrioma is unacceptable, however, in the face of a possible neoplasm. Although according to some data, hormonal treatment is rather effective in reduction of pain symptoms, its positive affect on fertility has not yet been proven, and the elimination of lesions has never occurred, thus making prevention of further disease progression doubtful. The cost of a course of treatment is comparable with that of laparoscopy. In addition, hormonal pretreatment hampers identification of the borders of infiltrative endometriosis, removal of a sclerotic endometrioma's capsula, and destruction of masked minor implants. The effectiveness and adequacy of surgical removal of the lesions depend on the surgeon's skill. Endometriotic foci fortuitously found during laparoscopy (in the absence of symptoms) should be removed carefully, without causing trauma to reproductive organs. In the case of symptomatic endometriosis, however, its visual borders do not always correspond to the real extent of the disease. This fact underscores the necessity for a critical appraisal of the adequacy of intervention performed. Various energies (electric, laser, cryo, argon-enhanced, ultrasonic) have almost no advantages over each other, and provide comparably effective destruction of the implants. According to different authors, laparoscopic removal of endometriosis results in 30–80% pregnancy rates.

In the case of ovarian endometriomas it is necessary to remove the entire capsule, both for oncologic reasons and recurrence prevention. A range of alternative modalities for surgical treatment of endometriomas without their radical removal has been suggested—from puncture and draining of endometrioma to destruction of the capsule by electric or laser energy. The recurrence rate of these techniques reaches 20%. Reconstructive laparoscopic surgery is possible for nodular or local-cystic adenomyosis in young patients who must be aware of high risk of recurrence as there are no distinct borders with normal myometrium. Some authors propose Nd-YAG laser for interstitial lysis of adenomyotic lesions, providing significant symptoms relief. However, total hysterectomy should be considered as the definitive method of treatment of adenomyosis.

Infiltrative retrocervical endometriosis can be removed by laparoscopy or combined laparoscopic– vaginal access, if indicated—en bloc with the involved part of rectal wall or the uterus. Aggressive procedures are not yet widely accepted and should be carefully considered, especially if the bladder, ureters, and bowel are involved. Such surgery is justified only when symptoms are related to functional insufficiency, and when potential complications are carefully considered. Therapy with GnRH agonists is

advisable as the first step of treatment of symptomatic endometriosis of nonreproductive organs in the absence of obliteration. If partial or complete obliteration is present, the treatment of choice is surgery enlisting appropriate specialists with technical expertise in bowel and bladder, and subsequent hormonal treatment.

Recurrence or persistence of endometriosis after treatment is one of the most vexing problems of gynecology, and is based upon the known unpredictability of the disease. In the absence of a method to provide a precise appraisal of the adequacy of elimination of the entire endometriotic substrate cannot be guaranteed by any surgical technique. Endometriosis recurrence rates vary from 2 to 47%. The highest recurrence rate is documented for retrocervical (or deep infiltrative) endometriosis, based on difficulties in estimating the real borders of the infiltrate, as well as the conscious rejection of more aggressive approaches to removal of the lesions, which are located near vital organs. Cases of persistence of endometriosis after radical surgery including bilateral ovariectomy have been reported. Because of this, the removal of both ovaries is justified only if they are involved in the endometriotic process and only in postmenopausal women, or in those who are finished with reproduction. Postoperative hormonal treatment for extensive, recurrent or persistent endometriosis would extend pelvic pain remission and reduce the risk of repeat surgery.

Endoscopic approach to genital anomalies

Congenital malformations of genitalia are rare but cause enormous physical, moral and social sufferings to the patients, who are often subjected to unfounded, repeated, ineffective and frequently mutilating surgery. Our experience with more than 1000 patients with malformations supports the use of endoscopy as an obligatory component of the algorithm of diagnosis and correction of all genital anomalies [22]. Vaginal aplasia is now preferably corrected by minimally invasive techniques of colpopoiesis—laparoscopic modification of the Vecchietti procedure and laparoscopically assisted colpopoiesis from pelvic peritoneum. The latter procedure used which we introduced in 1993 and practiced in approximately 200 patients, ensures that the characteristics of the neovagina are most close to physiologic. By this we mean sufficient capacity and depth, provided by the laparoscopic creation of a neovaginal vault, and the features of neovaginal epithelium equal to those of normal vagina provided by the unique metaplasia of the pelvic peritoneum used for the lining of the tunnel between the rectum and the bladder. Application of laparoscopy to the crucial steps of the procedure (examination of pelvic anatomy, identification of the most mobile part of peritoneum, creation of a tunnel between the rectum and the bladder, bringing the peritoneum down to the tunnel, formation of the neovaginal vault), made this technique of colpopoiesis much more safe and less traumatic than colpopoiesis by perineal access alone. When a functional uterus is present in a patient with vaginal aplasia, the as yet unsolved problem is the preservation of the uterus. However, having elaborated and attempted a combined perineal–laparoscopic access and retrograde hysteroscopy for identification of partially aplased cervical canal or of a site for creation of utero-perineal fistula, we believe this technique gives a chance of preserving the uterus and ensuring menstrual outflow. Our modification of this operation is based on bringing down the uterine tube to the neovagina. If such procedures appear impossible or ineffective, the treatment of choice is laparoscopic hysterectomy. A rudimentary uterine horn can also be easily removed by laparoscopy. The application of hysteroresectoscopy preceded abandoning the Jones and Tompkins metroplasties for the intrauterine septum. Since 1998, we have been performing reconstruction of the bicornuate uterus by a combined laparoscopic–hysteroresectoscopic approach, according to our own technique. This is much less traumatic compared with the abdominal Strassman method.

Prospective trends of endoscopy in woman's healthcare

Another promising application of the laparoscopic technique is oncogynecology. Laparoscopy is presently used in only some oncologic clinics, mainly for the diagnosis, staging and monitoring of the disease course. In reality, the potential of this approach is much wider—particularly because it allows radical treatment of endometrial and cervical cancer, including para-aortic and pelvic lymphadenectomy [23]. Based on our personal results of lymphadenectomy, we believe these techniques should be more widely used, not only in oncologic centers, but in general gynecologic practice as well.

Endoscopy should be accepted in obstetrical circumstances, for management of surgical pathology in pregnant and postpartum women who require operative treatment for adnexal masses, appendicitis, postpartum endometritis, and complications of operative delivery, including hematoma, hemorrhage, pelvic abscess, peritonitis. Of special interest is the possibility of using hysteroscopy in the minimally traumatic management of cervical pregnancy for control after cytostatic therapy and removal of the chorion remnants. We also see in the future the development of a new field of obstetrics and pediatric–fetal medicine, including minimally invasive endoscopic intrauterine correction of postnatal life-threatening developmental defects of the fetus (twin-to-twin transfusion syndrome, amorphic fetus, amniotic bands, etc.).

In elderly female patients with no severe extragenital disease, laparoscopic access under some specific conditions (minimal Trendeleburg position and small pneumoperitoneum) appears preferable, taking into account the peculiarities of wound healing and risk of cardiac-vascular and other complications after open surgery in aging women.

There is a distinct trend of breaking the boundaries of using endoscopy exclusively in gynecologic practice and placing it within the integrated complex of the diagnosis, treatment and monitoring of various diseases of pelvic and abdominal organs in women. Gynecologists often face the challenge of performing general surgical interventions such as appendectomy, hernioplasty, omentectomy and bowel resection along with gynecologic procedures [24]. Therefore, using the principles of simultaneous endoscopic surgery for associated gynecologic and extra genital pathology allows the surgeon to manage, in the course of one intervention and one anesthesia, two or more conditions. This circumstance clearly is beneficial for woman's health.

Conclusions

An analysis of present day medical literature defines the following qualitative changes in operative gynecology:

1. Using laparoscopy, hysteroscopy and methods based on endoscopic techniques in all unclear clinical situations, including emergent surgery, obstetrics, pediatry, urogynecology, oncogynecology;
2. Advantage of organ-preserving operations, where minimally invasive access enhances the value of reconstructive- plastic surgery;
3. Expansion of laparoscopic interventions toward radicality in accordance with strictly defined indications;
4. The combination of endoscopic procedures and performance of simultaneous surgery for associated gynecologic and extra genital conditions; and
5. The introduction of new technologies and modifications of endoscopic procedures with declining invasiveness.

The present state of gynecologic surgery is marked by significant alterations in the traditional concepts of education and training of the gynecologists and medical personnel, operating theatre organization and equipment, surgical techniques and technologies, medical standards of postoperative rehabilitation, and, finally, establishing a direct connection between the quality of life and the quality of treatment of the gynecologic patient.

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