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Size matters in planning hysterectomy approach

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Abstract

Hysterectomy is the second most common gynecologic surgery; approximately 600,000 women undergo hysterectomies each year in the United States. Estimated uterine size, either by bimanual examination, ultrasonography, or both, is one of the major factors in evaluating the need for hysterectomy and in selecting the surgical approach. In this article, we review how physician-estimated uterine size can be confidently used in providing optimal hysterectomy care, as data indicate estimation is closely correlated with actual post-surgical pelvic specimen weight.

Keywords

Hysterectomy, planning, approach, uterine size

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Introduction

Hysterectomy is the second most common gynecological surgery among women of reproductive age and is used to treat various benign conditions. Approximately 600,000 women undergo hysterectomies each year in the United States.[1,2] The primary surgical approaches through which hysterectomies are performed are vaginal, abdominal, or laparoscopic (with or without robotic assistance).[3] There is an increasing shift in practice from reliance on the abdominal approach to more minimally invasive approaches such as vaginal and laparoscopic. The abdominal approach is associated with longer hospital stay and recovery time, greater pain, and greater risk of infection, and minimally invasive approaches are associated with shorter lengths of stay and faster recovery times.[4] While various patient and case-specific factors influence the selection of surgical approach, clinically estimated uterine size, by bimanual examination, ultrasonography, or both, is one of the major determining factors in selecting the ultimate hysterectomy surgical approach.[5] The consequence of miscalculating the uterine size can result in an initial attempt at vaginal or laparoscopic surgery, which due to visualization of vascular pedicles or anatomic landmarks, or physical impediments for specimen removal, results in conversion into the larger-incision abdominal laparotomy approach. In this article, we review how physician-estimated uterine size can be confidently used in providing optimal hysterectomy care as data indicate estimation is closely correlated with actual post-surgical pelvic specimen weight.

Hysterectomy route selection

The primary surgical approaches through which hysterectomies are performed are vaginal, abdominal, or laparoscopic (with or without robotic assistance). Aside from personal training and experience, factors to be considered by the surgeon in selecting the hysterectomy surgical approach include: the size and shape of the uterus, pelvis, and vagina; accessibility to the uterus; extent of extra-uterine disease; the need for concurrent procedures; available hospital resources; and patient preference.[3] Each surgical approach is associated with its own advantage regarding outcomes and complication rates. When choosing the surgical approach, the surgeon should take into consideration how the procedure may be performed to optimize the patient's health and minimize the risk of complications. While in general it is recommended to take the most minimally invasive approach possible, the majority of the existing evidence specifically supports the principle that, when feasible, vaginal hysterectomy is the safest and most cost-effective route by which to remove the uterus.[4]

Even though there are existing guiding algorithms that incorporate the consideration of clinically acknowledged key factors for the selection of the most appropriate surgical approach, surgeon experience is most likely the most influential deciding factor. For instance, while some physicians may believe a narrow pelvis and vagina, an

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undescended and immobile uterus, nulliparity, prior cesarean delivery, and enlarged uterus to be contraindications for the successful performance of a vaginal hysterectomy, the literature indicates that many nulliparous women and women who have not given birth vaginally have undergone successful completion of the vaginal hysterectomy.[6] Even in cases where there is minimal uterine descent, if the vagina can properly be accessed, uterine mobility can be improved by transecting the uterosacral and cardinal ligaments.[7] In cases with enlarged uteri, techniques such as wedge morcellation (controversy to be addressed in the subsequent section), uterine bisection, and intramyometrial coring can be used to accomplish vaginal hysterectomy.[8]

Uterine size as determining factor

Given the fact that the definition of hysterectomy is the surgical removal of the uterus, its size is an impactful variable in guiding the surgical approach selection. A measurement of approximately 12 weeks or less usually allows for a vaginal approach, but that cutoff is loose and can decrease with time and experience.[5,9] If the estimate of uterine size is larger than 12 weeks, it is likely that the surgeon will choose an abdominal surgical approach. If the uterine size is estimated above 18 weeks, it is almost certain that an abdominal approach will be selected. The uterus must be small enough for the surgeon to be able to visualize surgical landmarks such as vascular pedicles, in order to safely detach the uterine specimen from the pelvis, and the uterine specimen itself must be able to be extracted from the body. An equally important consideration regarding the uterus is its shape and mobility. Furthermore, the presence of uterine fibroids also needs to be considered as they can prevent a vaginal surgical approach[10] and increase surgical complications as they limit the ability to safely secure the uterine vasculature, reach the uterine cornua, and obstruct uterine descent.

While a non-minimally invasive surgical approach may be absolutely necessary, it is best to consider it as a last resort. Minimally invasive surgery is linked to faster recovery and shorter hospital length of stay, with same day surgery as a reasonable option in some cases.[4] There are commonly used strategies to reduce uterine size, and thus allow for previously ruled out minimally invasive surgical approach. Preoperatively, uterine size can be reduced with gonadotropin-releasing hormone (GnRH) agonists, resulting in an average size reduction of 25–50%.[11] Uterine size can also be intraoperatively reduced by performing trans-vaginal uterine bivalving, morcellation, myomectomy preceding the hysterectomy to achieve visualization, and coring.[12,13] Uterine bivalving involves dividing the cervix and lower uterine segment into halves. Once this step is complete, the central portion of the uterine body is accessible and can be extracted. Coring can also be performed by making a circumferential incision at the level of the internal cervical os, and then sharply removing cores of myometrium from the uterus. With either method, the uterine body becomes suppler, permitting descent, mobility, and eventual unhindered access to uterine removal. However, if the above-mentioned strategies cannot be executed through the vagina, conversion into an abdominal approach will be necessary, and conversion is related to heavy blood loss, requiring possible blood transfusion.

The option to remove the uterine corpus and leave the cervix intact can be accomplished with laparoscopy. However, it must be kept in mind that maintaining the cervix requires continued cervical cancer surveillance/screening. In the United States, it is advised to screen women for cervical cancer until the age of 65 years post-hysterectomy unless early cervical cancer or advanced precursors were previously diagnosed and treated. If abnormal screening establishes the presence of high-grade neoplasia or cancer, or the patient develops symptoms such as persistent pain or abnormal uterine bleeding, a trachelectomy may be indicated.[14] Thus, the risk of a second surgery following supracervical hysterectomy should be considered in counseling women preoperatively.

The uterine corpus commonly is removed without the need for larger abdominal incision or a vaginal incision because a mechanical morcellator can be used to excise cylindrical strips of uterine tissue until the specimen is completely extracted from the peritoneal cavity. Thus, a laparoscopic minimally invasive approach would not be mitigated by uterine size or removal from the vaginal or abdominal dimensions as the morcellator functions through a 10-mm trochar access instrument. However, recent concerns related to morcellation in cases where an occult leiomyosarcoma may remain undiagnosed, and an associated increase risk of morbidity and mortality due to tumor dissemination and worsening prognosis via mechanical morcellation has tempered the laparoscopic supracervical hysterectomy. In response, accessories have been innovated to mitigate this risk. One example is specialized bag protection around the surgical instrument to prevent fragment dissemination into the peritoneal cavity in order to prevent the unintended rare case of occult leiomyosarcoma being morcellated, fragmented, and sprayed around the cavity.[15] Nonetheless, it is becoming apparent that the morcellation controversy has impacted surgeon selection of the minimally invasive supracervical hysterectomy. There is increasing hesitation in using the aforementioned surgical approach for cases with large uteri and possible fibroid existence, and because these types of cases also pose challenges for the vaginal approach, there is a need to initially plan the "larger-incision" abdominal approach.

Estimating uterine size

Uterine size is first estimated during the medical visit at which the patient's related complaint is first addressed. The responsible physician will conduct a bimanual preoperative examination, which includes palpation of the uterus, adnexa, anatomic spaces anterior and posterior to

the uterus, and rectovaginal septum; and speculum visualization of vagina and cervix.[16] The primary purpose of the bimanual preoperative examination is to examine the uterine anatomy relative to adnexal and pelvic anatomy and physiology, to assess the ability to retract and manipulate vaginal and pelvic tissue for the extraction of the uterine specimen. The assessment of vaginal adequacy is akin to pelvimetry, which should include an assessment of the hormonal status of the vaginal and peri-vaginal tissues. A confirmatory radiologic procedure is then usually conducted.[16] The most common is an ultrasound, which provides volumetric measurements: length, depth, and width of the uterus. It is common to have an in-office machine for clinicians to perform the procedure when needed. Magnetic imaging resonance and computed tomography scans are less common, but may also contribute information on uterine size and condition. Therefore, the physician decides the hysterectomy surgical approach at this preoperative visit in concert with examination findings and supplemental patient factors. Evaluation of the endometrium (thickness) is often included, and suspicion of endometrial carcinoma due to thickening or due to associated abnormal vaginal bleeding will result in endometrial tissue sampling prior to hysterectomy. Malignant diagnosis regarding the uterus, cervix, or adnexa would commonly shift the approach from vaginal to laparotomy or laparoscopy.

Accuracy of estimating uterine size

It has been found that uterine size estimation by physicians either by bimanual examination, ultrasonography, or both has a strong, positive, linear association with the actual pelvic specimen weight.[17,18] Pelvic specimen weight is the weight recorded in the laboratory's pathology reports of the entire extracted preserved surgical specimen; depending on the case, this may or may not have included adnexal structures. In one of our studies where uterine size estimate and pelvic specimen weight data were collected prospectively for 1079 patients who underwent elective hysterectomy for benign indications by 186 primary surgeons and assistant surgeons at 10 medical centers, it was found that the correlation between physician-estimated uterine size and actual pelvic specimen weight was 0.79 (statistically significant).[18] Thus, there is existing evidence that indicates that it can be concluded that it is likely that surgeons who use clinical evaluation to estimate uterine size can use the information obtained to plan a vaginal, laparoscopic, abdominal, or combined approach.

Addressing adnexal surgery during hysterectomy

Consideration for the need to evaluate cystic and solid masses of the adnexae may present the need to remove one or more ovaries during any hysterectomy procedure. This may present additional risk to the patient and affect their hormonal status (early menopause in bilateral oophorectomy in a pre-menopausal case) while also providing prevention against future carcinoma of the ovary or tube.

The risk of tubal carcinoma has been elevated and the American College of Obstetrics and Gynecology has advised the tubes be removed (bilateral total salpingectomy) in cases where the patient is undergoing total or subtotal hysterectomy.[19] Finally, while cystic masses can be drained intraoperatively and removed trans-vaginally or via laparoscopy, large solid masses will require removal via laparotomy.

Conclusion

Even though there are existing guidelines that incorporate uterine size as a high-impact factor for selecting hysterectomy surgical approach in an attempt to reduce the number of abdominal surgeries performed, analysis of US surgical data shows that abdominal hysterectomy is performed in 66% of cases, vaginal hysterectomy in 22% of cases, and laparoscopic hysterectomy in 12% of cases.[2] These are the most current rates despite evidence that vaginal hysterectomy offers advantages over abdominal hysterectomy with regard to surgery duration, complication rates, patient recovery and return to daily activities, and overall healthcare costs. Such a high rate of abdominal hysterectomies may be due to factors other than clinical considerations, including resident training, use of limited or outdated guidelines, a presumption of vaginal approach contraindications, and misconceptions about the benefit–cost analysis of vaginal hysterectomy.[20] Based on our study,[18] it can be concluded that over-estimation of uterine size leading to a higher abdominal approach is not the driving factor. It is apparent that practice patterns need to be addressed. Physician preference and experience can be assumed to be the driving factors behind the high rates of abdominal hysterectomies. Kaiser Permanente addressed this issue by conducting an intensive minimally invasive surgical approach training.[21] A number of studies spanning several years demonstrate that the use of more systematic guidelines for selecting the route of hysterectomy results in a major shift toward the vaginal approach.[4] Evidence also shows that trans-vaginal hysterectomy is both feasible and optimum for types of patients who have long been considered inappropriate candidates for the vaginal route,[3] and new methodology and technology facilitates the vaginal approach. Nevertheless, not until doctors are trained and comfortable with all hysterectomy surgical approaches will we be able to rely on evidence-based medical practice.

Future perspective

Advances in imaging and specimen handling in the future will allow for smaller incisions or more frequent vaginal attempts at removing the specimen. Computerized volumetric and geometric comparisons of specimen versus surgical

"aperture" dimensions might be used to plan the approach and evaluate for an atraumatic removal of the specimen in an intact status, obviating the risk of morcellation. Morcellation is re-emerging as a procedure encapsulated inside a trochar introduced intra-peritoneal bag and ultimately may include energy-induced (laser, radiofrequency, or a new technology) vaporization of tissue with simultaneous evacuation, removing the risk of spraying tissue fragments into the peritoneal cavity.

The vaginal hysterectomy approach is hindered by uterine size and the skill of the surgeon. Even vaginal morcellation or myometrial coring has the theoretical risk of dissemination of occult leiomyosarcoma. The challenge of supracervical laparoscopic hysterectomy has already been discussed above. The key advance will come from more exact preoperative diagnosis of women at risk for occult leiomyosarcoma using imaging (magnetic imaging resonance, computed tomography scans, or other modalities) or molecular marker technology that reflects sarcoma-associated genomic alterations, so that morcellation can be done at low or no risk.[22]

Ultimately, reducing the number of hysterectomies performed for the most common reasons such as a pelvic mass associated with leiomyomata or abnormal bleeding would be a major future goal. Advances in myoma removal or ablation and endometrial tissue ablation have already emerged, and in some cases could affect the sequelae associated with pain and abnormal bleeding, leading to a return to a more "normal" more tolerated, or even an optimal lifestyle.

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