Vaginal Reconstruction and Rejuvenation Surgery: Is There Data To Support Improved Sexual Function?

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Introduction: Vaginal rejuvenation and cosmetic vaginal surgery is one of the latest trends in urogynecology, gynecology, and plastic surgery. There is some confusion regarding what the term “vaginal rejuvenation” means, the surgical techniques and indications for this type of procedure, and how it may or may not differ from standard vaginal reconstructive techniques. There are also questions whether any scientific data are available to support the use of these procedures to enhance sexual function.

Materials and Methods: The current paper attempts to answer these questions and reviews the literature regarding this topic. The worldwide literature was searched using PubMed database and reviewed for relevant studies on the effect of prolapse and/or vaginal relaxation on sexual function and whether repair improves any dysfunction present.

Results: It is well documented in the literature that pelvic organ prolapse affects sexual function and that when repaired, sexual function improves as confirmed by validated sexual-function questionnaires. Damage to the vaginal walls and pelvic floor following traumatic childbirth may result in vaginal relaxation that may affect sexual function. The damage may not be severe enough to cause true prolapse or incontinence, but it may affect sensation and ultimately female sexual function. Vaginal reconstructive techniques that are designed to repair the caliber of the vagina are termed “vaginal rejuvenation” surgery. Repair of any anatomic changes affecting the caliber of the vaginal canal and perineum have been shown in recent studies to improve sexual function as well. Many women with complaints of vaginal relaxation are also found to have various stages of prolapse, and it is very important to recognize and repair these defects simultaneously as well.

Conclusions: Prolapse, albeit a more severe form of vaginal relaxation, when repaired, seems to improve sexual function in many studies. Recent studies also show that vaginal rejuvenation or repair/tightening of the caliber of the vagina prior to the development of prolapse may improve female sexual function. Further studies are warranted in this field.

Vaginal rejuvenation and cosmetic vaginal surgery are the latest trends in gynecology, urogynecology, and plastic surgery and have created controversy and debate throughout the world. This latest craze in “sex surgeries” or “nip and tuck below the belt” has created a stir in the press with articles being published throughout the world in mainstream women’s magazines, on television shows such as “Dr. 90210” and “Nip/Tuck” in the United States, and in newspaper articles, including The New York Times. It is a topic that seems to bring out emotional responses on both sides of the controversy. Many women’s groups are applauding the fact that “finally women are being listened to and being offered procedures to help with sexual function or sexual self-imagery or confidence.” Other groups, however, are very critical and feel that women are being forced to look “perfect” now in every part of their body, including their vaginas, and they feel that plastic surgery has gone over the edge now in this “final frontier.” The goal of this article is to discuss some of the controversy surrounding these topics, review the background and history of these procedures and the available data to support them, and review the techniques and complications of these procedures. Finally, we will also attempt to shed light on what is myth and what is science in this relatively new field of elective vaginal surgery for sexual function and, in some instances, for appearance of the opening of the vagina.

Many use the term “vaginal rejuvenation” to encompass all elective vaginal/vulvar surgery; however, we feel
that it should be used to refer only to functional procedures of the internal vaginal canal and introitus that are designed to enhance and/or restore sexual function. This includes ensuring adequate support of the pelvic floor and then also repairing internal vaginal canal and the introitus. We define “cosmetic vaginal/vulvar surgery” as procedures designed to improve the appearance of the external vaginal and vulvar structures, and this include procedures such as labiaplasty, labia majora reduction, augmentation, and perineoplasty for appearance. The current paper concentrates on repairs of the vaginal canal and support structures and their impact on sexual function.

**Vaginal Rejuvenation**

**Definition and Background**

“Vaginal rejuvenation” is a relatively new term that refers to repair of the vaginal canal and opening of the vagina for sexual function. It is a term that has recently created quite a lot of controversy in the field of gynecology and urogynecology as well as in the public eye because of all the publicity that has been generated by these new procedures. There seems to be much misinformation and confusion over what the term actually refers to, what procedures are actually being done, and where on the body they are being completed. Many think vaginal rejuvenation refers to cosmetic external surgery of the vagina and vulva, that is, labiaplasty, or hymen restoration procedures, while others may think it is some sort of magical procedure done to the inside of the vagina that enhances sexual function. We have coined the term to refer to “surgical procedures of the internal vagina and the introitus that are designed to repair vaginal relaxation and enhance or improve sexual function and sensation” of the female vagina; we reserve the term “cosmetic vaginal surgery” to refer to the outside of the vagina. Utilizing this definition, one realizes that this is not a new field at all, that is, gynecologists have been dealing with sexual dysfunction related to vaginal pathology resulting mostly from vaginal childbirth for hundreds of years. The difference, however, is that we are now listening to women and possibly doing vaginal repairs in women PRIOR to them having symptoms of or presenting with advanced prolapse. As will be discussed later, many women presenting for vaginal rejuvenation procedures actually have symptoms and findings of prolapse, and therefore a proper repair involves restoring the foundation of the pelvic floor support and then encompassing some of the newer concepts of vaginal rejuvenation in the repair (Figure 1).

Prolapse and vaginal relaxation occurring after vaginal childbirth is not a new concept. We have very good evidence that vaginal delivery increases risks for vaginal support problems, vaginal relaxation, prolapse, and incontinence. Various pathophysiologic studies have demonstrated marked changes after vaginal delivery to levator muscles, nerves, and pelvic support. It is clear that parous women are more likely to have pelvic organ prolapse, fecal incontinence, and urinary incontinence than women who have not borne children. There is ample epidemiologic evidence that vaginal delivery appears to be the strongest risk factor for pelvic floor disorders, at least in young and middle-aged women. In women participating in the Women’s Health Initiative, those who had borne at least 1 child were twice as likely to have uterine prolapse, rectocele, and cystocele as nulliparas, after adjusting for age, ethnicity, body mass index, and other factors. The amount of damage at the time of vaginal childbirth has also been shown to correlate with sexual function. At 6 months post partum, women with an intact perineum or first-degree perineal tear were more likely to experience orgasm than those with either second-, third-, or fourth-degree perineal tear. It also is interesting that if vaginal childbirth did not affect sexual function and/or risk of prolapse, why would 45.5% of urogynecologists surveyed state they would opt for primary elective cesarean section at the time of delivery?

One would not argue that surgery to correct pelvic organ prolapse or incontinence is not justified; however, there are very few data in the literature that look at sexual function related to vaginal and pelvic floor support. Although dysfunction of vaginal support
leading to incontinence, prolapse, and sexual dysfunction are highly prevalent, surprisingly little research has been undertaken regarding the sexual function portion of the equation. The American Urogynecologic Society has stated that any surgery for pelvic organ support should take into account restoring the normal anatomy and function of the pelvic floor and vagina, including maintaining support, and also maintaining or correcting bowel, bladder, and sexual function. Despite these goals, again very little information regarding sexual function and vaginal relaxation exists in the literature. In the current textbooks by leaders in the field of urogynecology, there are no chapters at all regarding sexual function and prolapse, and very little or no reference is made to it throughout the texts. Recently, Lowenstein et al in an article titled “Urogynecology and sexual function research. How are we doing?” concluded that disorders of the pelvic floor do influence sexual function and satisfaction; however, most pelvic floor research abstracts still do not mention sexual function in their outcome. Only more recently, as will be discussed in the upcoming text, have studies in prolapse repair really begun to take a close look at how the repair affects sexual function.

Therefore, the questions that really need to be asked are: (1) Does prolapse and/or vaginal relaxation cause sexual dysfunction? and (2) Does repair improve sexual function and/or sensation of the female vagina. Again, research and data regarding these specifics are lacking; however, we can look at some of the existing data and make some educated conclusions regarding vaginal relaxation and sexual function. The last question to be asked, which will be addressed later in the article is: Can vaginal relaxation that does not result in symptomatic prolapse such as true cystocele and rectocele cause decreased sexual sensation, and can its repair reverse these changes and lead to an improvement in sexual function?

**Prolapse and Sexual Function**

It is beyond the scope of this paper to review all of the anatomy and neuroanatomy of pelvic floor support and its relation to sexual function; however, we have good evidence that vaginal childbirth, as well as some other environmental and genetic factors, can lead to issues with pelvic floor support, which in turn can affect sexual function. Again, repairs of the pelvic floor and vaginal support have been completed for many, many years, and one would not argue that one of the goals of any of these repairs is to “restore sexual function.” Therefore, we must make the assumption that vaginal relaxation and prolapse affect sexual function in a negative way.

The literature supports this theory as well. In a recent study, Novi et al compared sexual function in women with prolapse to that of women without prolapse. They collected sexual function data utilizing a standardized, validated, condition-specific questionnaire, the Pelvic Organ Prolapse/Urinary Incontinence Sexual Function Questionnaire (PISQ), to compare the two groups. They found that prolapse had a significant negative impact on sexual function when the group with prolapse was compared to the group without prolapse. They also looked at patients without prolapse who had previous pelvic surgery to correct this and compared them with patients who had normal support with no previous surgery; they found that there scores were not significantly different, indicating the repair improved their sexual function scores. Botros et al attempted to assess the impact of childbirth on female sexual function using an identical twin study design. They administered the PISQ to 276 identical, sexually active twins and found that nulliparous women reported superior sexual satisfaction scores compared to parous women. Barber et al evaluated sexual function in women with urinary incontinence and pelvic organ prolapse and found that prolapse was more likely than incontinence to affect sexual activity and sexual relations. Rogers et al also found that women with urinary incontinence and/or pelvic organ prolapse, when compared to women without this dysfunction, had significantly poorer sexual functioning, as reported by the PISQ, and reported less sexual activity. This was also confirmed most recently by Wehbe et al at Drexel University. They did a review of the medical literature and concluded that sexual dysfunction is a common, underestimated complaint in women with prolapse and stress urinary incontinence, and treatment should be tailored to improving sexual function and quality of life. These studies have confirmed that prolapse, albeit a more severe form of vaginal relaxation, but certainly relaxation, does cause sexual dysfunction.

**Impact of Prolapse Repair on Sexual Function**

Most recent studies evaluating different prolapse repair procedures are focusing much more closely on the impact of the procedures on sexual function. Again, this is one of the major goals of any reparative surgery for vaginal support, that is, not to affect sexual function and hopefully to improve it. Much more focus has been directed toward this variable as of late,
especially as the subspecialty of urogynecology and reconstructive pelvic surgery continues to grow. Having this subspecialty actually allows us to collect more data and do more studies, critically evaluating procedures and measuring outcome variables more closely, instead of just relying on so called “accepted” procedures. Many new procedures are being scrutinized and some are criticized, such as vaginal mesh repairs, with regard to their impact on sexual function. However, it is interesting that when compared to historical “accepted” procedures without mesh, the rates of sexual dysfunction with these type of repairs are the same or less and have higher cure rates.14–18

Secondary to the mentioned factors, there does seem to be more data recently regarding the sexual function aspect of prolapse repair, and most studies are finding a positive impact in this regard. Srikrishna et al19 evaluated this concept and found that 83.6% of women presenting for prolapse surgery list “improved sexual function” as part of their goal for surgery. This clearly indicates that when asked, women with prolapse are stating the prolapse has affected their sexual function, and they would like it to be improved with their repair. In their study, they found a significant improvement in sexual function after the prolapse repair was completed. Azar et al20 utilized the Female Sexual Function Index (FSFI), another validated questionnaire, to evaluate women before and after surgery for prolapse and also found that sexual function was improved postoperatively after repair of the prolapse. Domain scores of desire, arousal, lubrication, ORGASM, and SATISFACTION were all increased significantly. Rogers et al21 recently confirmed this as well with a group of 102 women undergoing prolapse repair. The patients were evaluated preoperatively and postoperatively with the PISQ and were found to have significantly improved sexual function scores postoperatively. Stoutjesdijk et al22 also recently studied women undergoing vaginal reconstructive surgery and its effect on sexual function. They found a significant improvement in dyspareunia after surgery as well as improvement in the frequency and satisfaction with intercourse, concluding that vaginal reconstructive surgery for pelvic organ prolapse has a positive effect on the sexual well-being of the afflicted woman.22 These findings were also recently confirmed by Rogers et al23 in a multicenter prospective study evaluating sexual function after surgery for prolapse and/or incontinence with improved sexual function scores after repair. Thakar et al24 also confirmed this with improved PISQ scores following surgery for prolapse.

Kuhn et al25 from the University of Bern in Switzerland evaluated both male and female sexual function before and after prolapse repair. They evaluated 70 women and 60 men with the FSFI for the females and the Brief Male Sexual Inventory for men. FSFI scores improved significantly overall and in the domains of desire, arousal, lubrication, pain, and overall satisfaction. In men, interest, sexual drive, and overall satisfaction improved significantly.25 This again provides more data that confirms repair of prolapse seems to improve sexual function.

We feel that the posterior vaginal wall, anatomically, controls most of the vaginal caliber secondary to its relationship to the levator ani and genital hiatus, and repair of this wall is a major portion of most rejuvenation type procedures. Therefore, studies evaluating rectocele repairs may have more of a direct correlation to vaginal caliber and sexual function. Tunuguntia and Gousse26 found in a review of female sexual dysfunction following vaginal surgery that while posterior repair with levatorplasty leads to sexual dysfunction and pain in many women, posterior colporrhaphy completed alone, with the avoidance of levator ani plication, actually improves sexual function. Komesu et al27 evaluated sexual function in women with prolapse and/or incontinence who had or did not have posterior repair, and they found that women with posterior repair had improvements in sexual function on PISQ scores. Paraíso et al28 compared three different methods of posterior rectocele repair including one that utilized a graft and found that all three approaches resulted in statistically significant improvements in sexual function, again utilizing the PISQ questionnaire. Brandner et al,29 utilizing the FSFI, also confirmed this when evaluating 64 women before and after rectocele repair. They found significant improvement in arousal, pain, and overall satisfaction and concluded that rectocele repair improves sexual function.

Vaginal Relaxation and Effect on Sexual Function and Sensation

It is clear by the presented data that prolapse has a role in creating sexual dysfunction. The difficulty with this is that sexual function is multifactorial and therefore can be a very difficult area to study. It is also clear from these studies that vaginal repair improves sexual function and sexual quality of life, but is it because the prolapse no longer causes discomfort during intercourse or because without the prolapse the woman has an improved self image? Or, does the repair improve sexual function because the woman notices an increase
in sensation and no longer feels self-conscious that her vagina is loose, stretched out, or relaxed? Again, this is a very difficult issue to study, and to date the literature is lacking in this regard. We can, however, look at some basic anatomy and function of the vagina in its relation to sensation, orgasm, and sexual function and come up with very educated conclusions by putting together the available data; we may also consider the mentioned data showing that repair of vaginal prolapse improves sexual function.

Ozel and White recently published one of the first reports evaluating libido, sexual excitement, vaginal sensation, and ability to orgasm in a group of women with prolapse compared to women without prolapse. They found that women with prolapse and vaginal relaxation were significantly more likely to report an absence of libido, lack of sexual excitement during intercourse, and a much lower frequency of achieving orgasm during intercourse (all statistically significant) compared to women with the same demographics without prolapse (eg, multiparous, similar age, marital status). This really is a landmark study as it is one of the first studies evaluating the sensation of the vagina and the changes it may undergo following relaxation of the tissues that cause prolapse.

It makes sense that vaginal relaxation or prolapse may affect sensation. The reasons again may be multifactorial and difficult to ascertain. It has been shown that when voluntarily contracted, the pelvic floor muscles can intensify orgasms for women. Decreased sensation and difficulty achieving orgasm may be secondary to nerve damage from childbirth, muscular changes, and/or soft tissue changes, and to date we have no way of studying or confirming the exact cause prior to surgery. We can assume, however, that if most women with prolapse have improved sexual function following repair, that even in this more extreme situation causing true symptomatic prolapse, any associated nerve damage that may exist is overcome by the repair of the prolapse and returning the vagina back to its normal anatomic state.

It makes sense that vaginal caliber can affect vaginal sensation. This has been studied, and it has been shown that vaginal tone affects vaginal sensation and the ability to orgasm. Tone is composed of two variables: levator muscle tone and the elasticity of the vaginal tissues attached to the muscles. The vaginal caliber is directly related to the elasticity of the endopelvic fascia surrounding the vaginal canal and the tone of the levator ani muscles to which the tissues are attached. If the levator muscles are atrophied, the overall pressure that the vagina can produce is affected. Similarly, if the vaginal support tissues that are attached to the muscles are stretched out, damaged, or disconnected from the levators (at the white line or the arcus), vaginal tone and size are also affected, which ultimately can affect vaginal sensation and the ability to orgasm. Kline utilized a perineometer to evaluate vaginal tone and control (woman’s ability to create a sustained contraction and create vaginal tone) and showed that women with decreased tone or levator atrophy had a more difficult time reaching coital orgasm and, if reversed, their ability to achieve coital orgasm returned. It can be clearly seen in the cross-sectional view of the pelvis (Figure 2) that the vaginal canal is attached out laterally to the levators, and when the levators contract, the vaginal caliber is reduced and pressure is increased. Some argue that Kegel exercises alone can achieve this in a patient with decreased vaginal tone, and this certainly can be true in patients with true levator atrophy. However, if the endopelvic fascia is stretched out beyond its elastic capability to recover or is not attached to the levators at all, the levators, no matter how strong, cannot create a taut vaginal canal, thereby affecting vaginal sensation.

We have shown that vaginal prolapse can definitely affect sexual function, and its repair can improve
G-spot, named after Ernst Grafenberg, exists in the vaginal canal, typically located on the anterior vaginal wall. This has been studied and described sometimes as an area that lies beneath the posterior part of the "female prostatic gland" and therefore is typically found 2–3 cm inside the introitus on the anterior vaginal wall in the region of the bladder neck, which when stimulated becomes engorged, enlarged, "bumpy," and very sensitive and may induce orgasm with stimulation of this area alone (Figure 4). Recently, in a study evaluating the thickness of the urethrovaginal space in women with or without vaginal orgasm, a direct correlation of the thickness of this space (the G-spot) and the presence or absence of vaginal orgasm was found.34 Masters and Johnson, in their studies of orgasm, argued that clitoral stimulation was the source of all orgasmic response. They did not deny the possibility of vaginal sensitivity, they merely overlooked it and considered the vagina as merely a passive receptacle for the male organ and ejaculate. Vaginal sensitivity and the possibility of another sensitive spot, in addition to the clitoris, was brought to light during studies of female ejaculation in the late 1970s. Sevelly and Bennett initially described this "female prostatic gland" as the source of fluid that some women expel during orgasm. The area identified by their research subjects as the “trigger point” for their ejaculations, was the same area described initially by Grafenberg. They confirmed Grafenberg’s observation that this sensitive area could be located on the anterior vaginal wall, typically midway between the pubic bone and the cervix, on or near the urethra, and when stimulated it could lead to orgasm. They trained physicians in their technique, and in a study of 250 women, these physicians were able to locate the spot in all 250 patients. Mould confirmed this in several studies by
measuring electromyographic responses in the vaginal canal and the levators during stimulation of this area and the subsequent orgasmic response. His and other studies have clearly shown that there is sensation in the vagina itself and a nerve pathway that plays a role in sexual stimulation and satisfaction, and that if altered, may impair sexual function.

Vaginal caliber, size, and tone, therefore, may have a role in sexual sensation, stimulation, and orgasmic response. After vaginal childbirth, as with women with true pelvic organ prolapse, many women report decreased sensation vaginally with intercourse and difficulty reaching orgasm, which may lead to sexual dysfunction and sexual discontent. Perry and Whipple, in vaginal myography studies, have shown the average woman is able to register a 10-second sustained contraction on myography of 8.77 microvolts. They studied women with stress urinary incontinence and found they could only register between 2 and 4 microvolts. Now this could have been secondary to atrophy of the levators, or they may have had associated relaxation or prolapse of the vaginal support structures leading to these lower readings. They assumed that if a woman could not improve these contractions, she was not being compliant on the exercise routine. However, they did not address whether or not it may have been associated with relaxation of the vagina walls themselves or if the patient had a cystocele or rectocele. It makes sense that in a woman with a larger caliber vagina from relaxation of the vaginal walls, there will be less sensory input with vaginal intercourse and penile penetration, even with levator muscles that have adequate tone and no atrophy. It is the vaginal walls themselves that are stretched out or torn away from the levators, causing the larger caliber vaginal canal. The muscles themselves are fine and this is why Kegel exercises do not work in many women with vaginal wall relaxation or prolapse. A larger caliber vagina will lead to less contact and friction and ultimately less stimulation of the vaginal walls and to the G-spot itself, which again will result in orgasmic and sensory dysfunction. The G-spot needs direct stimulation from the penis during intercourse to become aroused, and if the caliber of the vagina is large or relaxed, this may not be possible. Vaginal size may also affect the woman’s partner to achieve orgasm, which again can lead to sexual dysfunction and dissatisfaction not only for the partner, but for both partners.

The theory that vaginal size is related to sexual sensation has been recently confirmed by Pardo et al in a recent study on a group of women who presented with symptoms of a wide or relaxed vagina, and were interested in vaginal repair for sexual function alone. The women had no symptoms of prolapse or incontinence. Inclusion criteria included a sensation of a wide or loose vagina alone in combination with a decreased or lack of ability to reach orgasm. Exclusion criteria included symptomatic prolapse (cystocele, rectocele, or vault/uterine prolapse), dyspareunia, primary anorgasmia, or psychologic impairment (all patients had psychologic evaluation). Fifty-three patients were included in the study and 96% of the patients experienced decreased vaginal sensation; 73% described difficulty achieving orgasm, and 27% could not reach orgasm. All but 2 patients had previous vaginal deliveries. Following surgical repair of the vaginal caliber and tightening of the vagina itself, 90% of women reported their sexual satisfaction was much or sufficiently improved, and 94% of women were able to reach orgasm. This confirmed that vaginal size has a direct impact on sensation and ability to orgasm and, when repaired, sexual function improves.

**Vaginal Rejuvenation Surgical Techniques**

*Importance of Proper Evaluation and Diagnosis*

The importance of proper preoperative evaluation of a patient who requests vaginal rejuvenation surgery to repair what she conceives is a loose or relaxed vagina for sexual enhancement cannot be stressed enough. This includes proper medical history, psychosocial evaluation for sexual dysfunction, and/or sexual satisfaction prior to any of the anatomic changes she may have noted since childbirth. Marital or relationship issues or concerns and an evaluation of her expectations of surgery and the reason she is interested in the procedure should be discussed as well. It is true that most women who present to our clinic had a very satisfactory sexual life and then experienced a major change subsequent to their pregnancies and deliveries or gradually by aging. However, sexual dysfunction is very complex and multifactorial and, of course, a surgical procedure to repair vaginal support and reduce the vaginal caliber, will not reverse or change psychologic or psychosocial sexual dysfunction arising from previous abuse, primary anorgasmia, relationship issues, depression, or other more complex psychologic dysfunction.

We have found, however, that most women presenting for this type of surgery do not have this type of dysfunction at all. They present and state, “Since the birth of my child or children, my vagina and sex life has not been the same. I had a tear and my vagina
never returned to the size it was before children, and this has affected my sex life as my vagina feels very loose or wide and I have less sensation and difficulty reaching orgasm, which makes my partner and I frustrated.” We also find that most women have done Kegel exercises and have not found any improvement with this and therefore present for a possible surgical solution. However, there will be women who present with psychologic issues that need to be addressed and will not be deemed surgical candidates. Patients also must have reasonable expectations of surgery, and this has to be conveyed to them by the surgeon. They need to realize that not all women will respond to surgery because of underlying nerve damage, which cannot be detected prior to surgery, and that risks such as less sensation, or pain with intercourse are risks of any surgical procedure. We have found that when women are well educated and informed and have reasonable expectations, the success of any surgery is much higher.

Of course, in addition to a medical and psychosocial history, an adequate urogynecologic history and physical exam must be completed. Sexual dysfunction related to a sense of a relaxed or loose vagina may be the first sign of the beginning stages of pelvic floor dysfunction and prolapse, and therefore an adequate history must be taken. We have actually found that as many as 50–75% of patients who present for vaginal rejuvenation, when asked, have symptoms of urogynecologic pathology, including urinary incontinence, voiding dysfunction such as overactive bladder or difficult emptying, feelings of pressure or the sense that their organs are falling, defecatory dysfunction, or dyspareunia related to the uterus being hit during intercourse because of prolapse. It is vitally important to have an adequate understanding of the symptoms that prolapse can cause. We use validated questionnaires such as the Urinary Distress Inventory (UDI-6), Incontinence Impact Questionnaire (IIQ-7), and the PISQ-12 to evaluate patients for these symptoms as well as a general urogynecologic history form. If significant symptoms of urogynecologic pathology are present, this must be evaluated preoperatively so that it can be addressed properly during surgery.

We have also found that as many as 75% of patients who present for vaginal rejuvenation are found to have true prolapse on exam, either cystocele, rectocele, uterine/vault prolapse, or a combination of findings and that this is their major pathology and is what is leading to the sense of a relaxed vaginal canal. They do not need vaginal rejuvenation—they need true pelvic reconstructive surgery. This is why a proper urogynecologic exam in the supine and standing positions with a proper Pelvic Organ Prolapse Quantification System (POP-Q) evaluation is necessary to assess for overall pelvic floor support. Again, it is vital to properly diagnose any pelvic floor prolapse prior to any surgical procedure of the vagina, as vaginal rejuvenation or repair of the opening and caliber of the vagina will not repair a prolapsed uterus, a significant cystocele/rectocele, or urinary incontinence. We stress to patients that the foundation of support MUST be corrected and intact prior to any repair of the caliber of the vagina or the opening. We have seen many women from other institutions who had a “vaginal rejuvenation” procedure completed and found that they still feel as if things were not right or feel as if something has dropped in their vagina. On examination, we find that they have complete uterine prolapse, which most likely was present and not recognized nor addressed at the time of their initial procedure. These are the reasons we feel that only experts in vaginal reconstructive surgery should complete any and all vaginal repairs, including vaginal rejuvenation—not only for the surgical skills required, but also to have the experience to make a proper diagnosis to determine what exactly needs to be done at the time of surgery.

Surgical Procedures

As stated, the surgical procedure required is determined by the patient’s physical exam. Again, most women who are interested in vaginal rejuvenation type surgery or surgery to correct a feeling of a loose or wide vagina, are found to have prolapse in the form of cystocele, rectocele, or uterine/vault prolapse. In most instances, it is POP-Q Stage II or less; however, it is present and must be repaired. This is what determines what surgery will need to be done because the prolapse must be corrected first, prior to any rejuvenation procedures being completed. It is really the first step in an overall repair or “rejuvenation” of the vagina and pelvic floor. The upcoming case study is a typical presentation of a woman who presented to our center for vaginal rejuvenation.

Case Study

A 38-year-old woman, gravida 3, para 3, presents for vaginal rejuvenation surgery. She states that since the birth of her children, her vagina feels very loose and relaxed. She states that she has less sensation vaginally, and although still coitally orgasmic, it takes her much longer, and many times the orgasms are not as intense or she does not reach orgasm. She states
this was not the case prior to her deliveries because she was able to have vaginal orgasms with intercourse very easily. She feels that the opening of her vagina is gaping, and she does not have any grip or squeeze of the penis upon entry, which she used to have. She feels like she just goes through the motions of intercourse for her husband as she really does not feel anything and this depresses her. She has gone for pelvic floor physical therapy and has been doing Kegel exercises for several years, and although the therapist has deemed her to have good levator tone and control, this has not improved her situation. With further questioning, she also states that she has had pain with deep intercourse for the past year. She states it feels as if her partner is hitting something with deep penetration, and this causes her significant pain at times. She feels very self-conscious about her vaginal relaxation, and although her husband has never said anything to her, she feels that he notices a difference as well. She denies any symptoms of prolapse or urinary symptoms, including incontinence, and she denies any bowel dysfunction.

On exam, the patient is found to have a cystocele to the introitus, a prolapsed uterus within 2–3 cm of the introitus, and a mild rectocele with significant relaxation of the introitus secondary to perineal muscle damage resulting from childbirth. She has excellent levator tone and good control of her levators.

This case typifies how many women present interested in vaginal rejuvenation. This patient does not need just a vaginal “nip and tuck,” and it would be a disservice to offer her this type of procedure. She needs pelvic reconstruction including cystocele repair and uterine suspension to restore her foundation, prior to repairing or reducing the caliber of the vagina and introitus for the purpose of enhancing vaginal sensation and sexual function.

**Repairing Prolapse First**

As already stated, vaginal rejuvenation procedures are alterations of vaginal repairs that we are already completing; however, they do become more involved and more attention is paid to the final diameter of the vagina and the opening of the vagina. However, prior to this, the first step in the procedure is correcting any prolapse that exists.

**Anterior Vaginal Wall**

If a significant cystocele is found on exam, this needs to be repaired with standard techniques. We feel that a cystocele that is Stage II or larger should not be repaired vaginally as a traditional anterior repair is a compensatory procedure, with cure rates only in the range of 50%, and can shorten the vagina. Most cystoceles are caused by paravaginal defects and as they get larger, we feel that a proper repair should be done via a paravaginal defect repair (Figure 5a, b, and c). This can be completed vaginally; however, we feel a laparoscopic or abdominal approach is much more anatomic, and the defects can be repaired with direct visualization. We have shown that more than 94% of women presenting with cystoceles or stress incontinence have paravaginal defects identified during laparoscopic exam. Repairing the defects laparoscopically allows the cystocele to be repaired with anatomic restoration of the anterior vaginal wall and maintenance.
of normal length. Additionally, no incision is made on the anterior wall, theoretically, avoiding dissection in the region of the G-spot and preserving the nerves to the area.

**Uterus and/or Vaginal Vault**

If uterine prolapse or vault prolapse is present (Figure 6), this again needs to be addressed as part of the surgery. One could argue that the vaginal canal could be treated entirely via a vaginal approach and repair of the canal alone; however, if uterine/vault prolapse is present, this is not treated at all by rejuvenation or any vaginal repair. The vault is the anchor of the entire pelvic floor system and this is why most patients present with recurrences after pelvic floor surgery, that is, the vaginal vault was either not diagnosed as having a deficit or was not addressed during the repair. Patients frequently present with failure after anterior/posterior repair for prolapse and think they have a recurrent cystocele, when indeed they have vault prolapse causing the defect. In a younger woman presenting for rejuvenation or for sexual dysfunction secondary to feelings of a relaxed vagina, the vault must be adequately supported. If vault or uterine prolapse is found, it must be treated.

Many younger women presenting for vaginal rejuvenation are not ready for hysterectomy and wish to retain their uterus. Many are actually shocked to hear that their uterus is almost prolapsing out of the opening of the vagina and therefore have not prepared themselves psychologically about the possibility of needing a bigger surgery or a hysterectomy, nor are they ready to have their uterus removed thus creating permanent sterility. It is for these reasons, that uterine suspension is a viable option for these patients who have no other uterine pathology except prolapse. We have found that in women with true uterine prolapse, mesh must be used to achieve adequate support and an acceptable long-term cure rate. Many times with uterosacral and round ligament plication, we cannot elevate the uterus up high enough in the canal, and the long-term cure rates are poor when using this technique. We have been using laparoscopic sacral hysteropexy (Figure 7a, b, and c) in these patients, which is a minimally invasive alternative to achieve excellent uterine support and to minimize risks of recurrence. Alternatively, if the patient wishes for hysterectomy and/or there is other uterine pathology to consider, then hysterectomy in combination with vault suspension is a viable option. We typically will complete LAVH (leaving the ovaries in situ in younger women) in combination with laparoscopic uterosacral suspension or laparoscopic sacral colpopexy (Figure 8a and b) to support the vault, prior to repair of the vaginal canal.

**Rejuvenation of the Vaginal Canal and Introitus**

Repair of the posterior vaginal wall and the introitus are the key aspects to any vaginal rejuvenation procedure. Vaginal rejuvenation surgeries are alterations and modifications of vaginal repairs for prolapse that focus on the final diameter and caliber of the vagina and attempt to restore it back to its pre-childbirth state. However, they go far beyond the simple traditional
posterior repairs and perineoplasty of old. The focus of these older procedures is simply to restore and reduce the bulge, whereas the focus of vaginal rejuvenation is to restore the caliber of the vagina and genital hiatus back to pre-childbirth state from the introitus all the way up to the apex. These procedures are much more extensive and meticulous. No drop-offs or dips should be felt, and there should be no tension placed on the levators that causes lateral banding of the vagina. Additionally, the cosmetic appearance of the introitus and perineal body is also taken into account and requires an intricate dissection and repair to not only restore function of the introitus, but also to obtain an appearance that the woman desires. That look is of the vaginal opening being closed, not gaping or wide open with a normal length perineal body that does not bulge out following the repair. This look is sometimes difficult to obtain, without making the introitus too tight, which will cause pain with intercourse.

**Posterior Wall, Introitus, and Rejuvenation**

The posterior vaginal wall is the focus of any vaginal rejuvenation procedure. In a woman with a mild cystocele or mild relaxation of the anterior vaginal wall, a small anterior colporrhaphy (Figure 9) can be completed to take care of this prior to repair of the posterior wall. However, one needs to be very careful with this—if the repair of the anterior wall is too aggressive, it will lead to lateral banding and constriction of the vagina before the posterior wall is even started.

An incision is made at the introitus, typically in a trapezoid pattern, which will also be used in the perineoplasty portion of the procedure. A small incision is then made in a vertical fashion on the posterior wall, and the vaginal epithelium is dissected off the underlying rectovaginal fascia all the way laterally out to the levators. The dissection must be taken all the way up to the apex of the vagina, as the repair needs to incorporate the entire posterior wall to restore the caliber of the full length of the vagina. If a rectocele is present, the fascia is repaired in a site-specific fashion

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**Figure 7.** Uterine suspension with mesh. (a) Lateral view of pelvis depicting mesh (in red) suspending uterus and top of vagina to presacral ligament (mesh sacral hysteropexy). (b) Laparoscopic view of mesh sutured to lower uterine segment. (c) Closure of peritoneum over mesh following attachment of mesh to presacral ligament. Copyright 2010, RD Moore and JR Miklos.
with delayed absorbable suture. The caliber of the vagina is then addressed by plication of the rectovaginal fascia in the midline with delayed absorbable sutures. Levator plication is avoided; however, the diameter of the vagina is constantly measured and several layers of plication may be needed to reduce the genital hiatus and reduce the caliber of the vagina to an appropriate level. A small amount of vaginal epithelium is then excised and the incision closed in a running fashion.

A perineoplasty is then completed, involving a very meticulous and detailed dissection out laterally to obtain the lacerated edges of the deep and superficial transverse perineal muscles and bringing them back together in the midline to achieve uniformity at the same level of the posterior wall repair. The inferior edges of the labia majora that will make up the posterior fourchette of the vaginal opening must be marked at the beginning of the procedure so that these edges match up during the closure to form the vaginal opening. An appropriate amount of skin must also be excised from the perineum and introitus to result in a cosmetically pleasing appearance of the opening of the vagina for the patient. A multilayer, (typically this may involve 4 or 5 layers) is completed at the perineum and introitus (Figures 10 and 11).

When vaginal relaxation is repaired primarily for sexual function, it becomes a much more meticulous dissection and repair as the surgeon constantly has to judge and measure the vaginal caliber to try to restore the entire vaginal length to its pre-childbirth state. If this is not done, the results will be poor and the patient’s sexual function may not change or it will be worse secondary to pain, vaginal shortening, scar tissue formation, and/or constrictions.

Laser Vaginal Rejuvenation

Laser vaginal rejuvenation is a modification of the repair initially described by Dr David Matlock in Beverly Hills, Calif. Dr Matlock, a gynecologist, is the forefather of much of the work in vaginal repairs following vaginal childbirth for improvement of sexual function as well as the use of the laser in vaginal and vulvar cosmetic surgery. Many of his techniques utilizing the laser are trademarked and patented, therefore we are not at will to discuss the details of the surgeries here. He uses modifications of traditional vaginal repairs but considers the laser procedures to be much more in-depth and detailed than traditional repairs. He feels that his techniques that uses the laser in the repairs decreases morbidity, is less invasive, creates less scarring, and results in optimum vaginal caliber and sensation for sexual function and enhancement. We have also incorporated some of his techniques into many of our repairs and agree with his findings to date.
Postoperative Care

Routine postoperative care is given to patients undergoing vaginal surgery. Many of the procedures are completed on an outpatient basis, and the surgery is completed under spinal or general anesthesia. Vaginal packing is left in for a short period of time and removed prior to the patient being discharged.

Routine instructions for vaginal surgery are given to the patient, and the patient returns for follow-up 4 weeks after the surgery. The vaginal introitus and caliber is assessed and, if felt necessary, the patient will begin perineal massage in a warm water bath for 1 to 2 weeks prior to resuming sexual relations.

Figure 9. Illustration of steps of anterior repair of cystocele. Copyright 2010, RD Moore and JR Miklos.
Clinical Data on Results of Vaginal Rejuvenation Surgery

Pardo et al\textsuperscript{39} have published the only clinical data on repair of vaginal caliber for sexual function. They reported on a group of 53 women who underwent colpoperineoplasty for a sensation of a wide vagina and secondary loss of sexual satisfaction. Patients who were found to have prolapse, that is, a cystocele, rectocele, or vault prolapse were not included in the study, therefore maintaining a very select study group of patients who previously had a satisfactory sexual life but noted major changes following vaginal childbirth and/or aging. They were also screened for psychosocial disorders, and any patient who revealed personality upheavals or classic sexual dysfunction such as vaginismus, dyspareunia, primary anorgasmia, and/or sexual partner dysfunction were not considered candidates for the treatment. They found that after colpoperineoplasty, using a YAG laser in their dissection, as well as other techniques described by Matlock\textsuperscript{39}, that 90\% of the women had much or sufficiently improved sexual activity, and 95\% had their expectations partially or completely fulfilled by the surgery. No patient reported worsened sexual function; however, 4\% of patients reported regretting undergoing the procedure.\textsuperscript{39} In a follow-up study, they confirmed their findings in a second group of patients.\textsuperscript{40}

Goodman et al\textsuperscript{41} led a recent multicenter United States study on women undergoing female genital plastic surgery including vaginoplasty/perineoplasty for vaginal relaxation affecting sexual function. Preoperatively, 83\% of women reported their sexual function as fair/poor. Postoperatively, 84\% of 69 women following vaginoplasty/perineoplasty for sexual function reported enhanced sexual function following repair, with only 2\% reporting a negative effect on sexual function, confirming repair of the vaginal caliber may lead to improved sexual function in women presenting with relaxation.\textsuperscript{41}

At our center in Atlanta, we recently conducted a retrospective study of 76 women who underwent vaginal rejuvenation surgery, either alone or in conjunction with prolapse repair and analyzed quality-of-life questionnaires including the PISQ-12 (preoperative and postoperatively) and the Pardo questionnaire for vaginal rejuvenation that was used in his study.\textsuperscript{39} Our preliminary findings (with patients being at least 6 months post surgery) agree with these previously published studies. PISQ-12 scores significantly improved from a mean of 30.4 (range 13.2–46.0) preoperatively to 38.9 (range 26.0–47.0) postoperatively ($P < .001$, paired $t$ test), indicating an overall improvement of sexual function. Concerning postoperative satisfaction, 85\% of women felt their sexual life had improved, 90\% had their expectations met, and 70\% had improved sensation (only 2.7\% reported less sensation). Interestingly, 23\% of patients felt that they would have liked the vagina to be tighter than their postoperative results. Overall, these preliminary findings confirm that vaginal rejuvenation surgery seems to have an overall improvement in sexual function. This will be the first study to utilize validated sexual function questionnaires to evaluate vaginal rejuvenation surgery.

Conclusion

Vaginal rejuvenation surgery is one of the latest trends in elective vaginal surgery for women. It is a repair of the vaginal caliber in women who suffer from decreased vaginal sensation or of feelings of a loose or wide vagina that affects their sexual life. In many instances, women who present with these symptoms are found to have other urogynecologic pathology such as prolapse that must also be addressed.
in any repair contemplated. Sexual dysfunction or decreased sexual sensation may be one of the first symptoms that women suffer from in the progression of prolapse and therefore a proper exam is vital prior to any repair. We have ample evidence, as seen here, that prolapse and vaginal relaxation can create sexual dysfunction and that repair may reverse these changes in many women. However, when dealing with sexual dysfunction alone and the caliber or width of the vagina, the surgical repair must be very meticulous and exact to enhance sensation and function and not impair it. This sums up the statement “The Art of Surgery”!

References


