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Troubleshooting Vaginal Stents: A Critical Review of Common Problems and Solutions

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ABSTRACT

Vaginal agenesis is the most common condition affecting women known as Mayer-Rokitansky-Kã¼Ster-Hauser syndrome (MRKH). After surgery, vaginal stents are prosthetic devices that are utilized to keep the vagina that was rebuilt from potentially contracting. They ensure that the neovagina keeps its shape by assisting in maintaining the width, depth, and preventing stenosis. But there are some potential problems associated with the use of vaginal stent which needs to be addressed for better functioning and in improving overall quality of life for women. This review article deals with the potential problems associated with the vaginal stent.

Key words: Vaginal stent, MKRH syndrome, Vaginal agenesis, Silicone stent.

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INTRODUCTION

Vaginal agenesis refers to a condition in which uterus may only develop partially or not at all popularly known as MRKH syndrome [1]. According to a statistical survey 39% of women in India experience some form of mental health disorder. There are major concerns regarding women's health which include Violence, Breast and cervical cancer, reproductive health problems etc. among which Reproductive health is the most neglected concern hence we must re-commit to addressing them. Vaginal agenesis is estimated to occur in approximately 1 in every 4500 females [2]. Vaginal stent is designed to support and maintain the shape of the vagina. It is typically used in cases where there has been a surgical procedure or trauma that requires support for the vaginal walls. Mc India technique is used in vaginal reconstruction and it is the most widely accepted treatment methodology [3].

OTHER COMMON USE FOR VAGINAL STENTS CONSISTS OF

Post-surgical support

Following surgeries such as vaginal reconstruction or the excision of vaginal tumors, a vaginal stent may be utilized to preserve the vaginal walls during their healing process. Treatment for vaginal agenesis: For women who are born without a vagina, a vaginal stent may be a component of a plan to develop or preserve a vaginal canal [4]. Pelvic organ prolapse: In cases, where organs including the bladder, uterus, or rectum intrude into the vaginal region, a vaginal stent may be used temporarily to preserve the vaginal walls [5].

Radiation therapy

Patients who underwent radiation therapy for gynecological cancers, vaginal stents may be used to help maintain vaginal shape and prevent vaginal shortening or narrowing due to scarring [6].

Patients with Gender Dysphoria

Who experience severe discomfort or difficulty due to the incongruence between their gender identity and their given gender at birth are said to have gender dysphoria [7]. Materials used in the fabrication of vaginal stents include silicone

and acrylic resin. However, their use is not without drawbacks, and clinicians must be aware of potential issues to optimize patient care and outcomes [8]. It's crucial to explain the patient what post insertion care needed to be taken in order to get the required benefits of vaginal stent. But in some cases, post insertion problems may occur which need to be look after. The problems may be related to the material used, soft tissue injury caused by the stent, allergic reactions etc. which ultimately will cause discomfort to the patient. Hence, we should look after them judiciously for better treatment outcome.

FOLLOWING ARE THE POTENTIAL ISSUES OR PROBLEMS FACED POST VAGINOPLASTY AND WITH USE OF VAGINAL STENT AND ALSO THE ALTERNATIVE OPTIONS TO SUCH CONDITIONS

Hardness of the stent

The acrylic vaginal stent because of its hardness cause discomfort to the patient hence patients find it difficult to perform normal daily activities because of hindrance caused by the hard and bulky acrylic made stent. This problem can be overcome by either using different material for its fabrication such silicone its properties are superior to that of acrylic as it is soft, light weighted as compared to the acrylic stent [9]. Another method to overcome this problem is by fabricating hollow vaginal stent which will reduce the weight of the stent thereby making it less bulky. The hollow vaginal stent can be fabricated by using ice, soap, salt etc during its fabrication [9].

Pain

Pain during daily activities might result after post-stent implantation, particularly when an acrylic stent is used. Strategies for reducing discomfort during dilation include the use of lidocaine jelly, estrogen cream, or oral analgesics. If the patient has pain while inserting the stent, increasing the amount of lubricant may also be helpful. Transitioning to a softer dilator or stent can help reduce pain in women with Rokitansky Kuster-Hauser Syndrome, as particularly in this patient's post-surgery they may have reduced vaginal blood flow compared to normal women [10].

Bleeding

The most typical post-operative bleeding followed to surgery and after placement of stent post-surgery is common. Examining the patient to check for trauma can be beneficial if they are bleeding. The bleeding is usually caused by irritation of the mucosa. Trauma may be avoided by utilizing a larger stent and increasing lubrication while insertion of the stent [11].

Fungal Infection

Often caused by Candida species. These infections canoccurdue to an imbalance between the vaginal microbiota and yeast. Mostly the silicone vaginal stent is more prone to fungal infections [12]. To overcome this silicone stents can be coated with polyethylene glycol (PEG) or propylene glycol. PEG is a stable, hydrophilic substances exhibiting no skin irritation and hence as a surface coating will enhance biocompatibility and promote tissue integration. Additionally, research is being conducted on resorbable stents, which are made of shape memory foams based on polycaprolactone. These stents lower the risk of fungal infection and discomfort by providing enough radial force to maintain vaginal diameter during a 4-week target healing time [13].

Malodor

It may be caused by foreign body reaction, material degradation, bacterial overgrowth, retention of bodily fluids, etc. This can be avoided by providing the patient with appropriate post-operative instructions, such as cleaning the stent with Use of a solution of vinegar or 25% povidine iodine in water for initially and then an antibacterial soap solution can be used for cleaning followed and patting it dry with a clean paper towel to avoid an unpleasant stench [14].

Vaginal stenosis

Scar tissue inevitably occurs following vaginal reconstruction when the canal lining heals over time, causing the vagina to become shorter and narrower. This condition is known as vaginal stenosis. Scar tissue undergoes a process known as scar contracture or scar maturation during healing because it lacks the elastic qualities of native, unmodified tissues. Stents are necessary following vaginoplasty in order to prevent vaginal stenosis because of the characteristics of wound healing and scar contracture. As this is a patient-driven treatment, vaginal stenosis may still occur even after a vaginal stent has been placed due to patient's negligence. It may also occur when a patient has not been kept on regular recall because in certain situations, a different size vaginal stent may need to be

made in order to maintain the stent's patency. Therefore, before being released from the ward, patients must demonstrate how to can use the stent correctly. And hence, precise and easy- to-follow instructions for using the stent are essential to the treatment's efficacy [15].

Deterioration & Discoloration

The materials used in vaginal stents, such as s polymers, can degrade over time due to exposure to bodily fluids, temperature changes, and mechanical stress. This degradation can lead to weakening and eventual failure of the stent. Also Contact with bodily fluids and tissues can cause chemical reactions with the stent material, leading to degradation. For example, pH changes or enzymatic activity in the vaginal environment can contribute to material breakdown [16]. Moreover, Continuous use of the stent can subject it to mechanical stresses such as bending, stretching, and compression, leading to fatigue and eventual failure of the material. Though none of the material is ideal in this case, eventually with time both silicone and polymers tend to get discoloured and deteriorate. In such case to avoid this ask the patient to Avoid excessive bending, stretching, or manipulation that can stress the stent material. Proper insertion and removal techniques should be explained to the patient to minimize damage to the stent. Approved lubricants or gels such as Surgilube or KY Jelly should be prescribed to the patient for lubrication during insertion or removal.

Allergic reaction

While allergic reactions to acrylic vaginal stents are rare, they can occur. Allergic responses may manifest as local irritation, redness, itching, or discomfort. Allergy testing should be recommended to identify the specific allergen causing the reaction. In some cases, alternative materials (such as silicone-coated acrylic) may be considered to minimize the risk of allergies. Additionally, PACIENA prosthesis®, which is fitted to the typical vagina, can be utilized in these situations. It is made up of PLA (poly lactic acid), a biocompatible substance with numerous biomedical applications, its effect on tissue growth has been shown in a variety of settings [17].

Vaginal dryness

Vaginal dryness can occur post-surgery and hence increasing the amount of lubricant may help if the patient has trouble inserting the dilator due to vaginal dryness otherwise it can cause severe pain and discomfort to the patient. In general, use of lubrication is necessary as the vaginal canal is lined with epithelium. Epithelial cells die as they make their way to the surface and slough off (exfoliation). The neovaginal lining sheds dead epithelial cells which is why water-based lubricants, not silicone-based lubricants, are recommended. Silicone mixes with dead epithelial cells which causes an unpleasant discharge. Silicone lubricants can also damage the medical grade silicone stents [18].

Patients discomfort and compliance

It is important to consider the patient's mental health throughout the entire treatment, as patients who have vaginal agenesis or dysfunction also tend to have greater rates of depression and body image difficulties, as well as sexual dysfunction. These factors often result in poor patient compliance with stent therapy, leading to suboptimal treatment outcome. As part of continuing care, these issues must be addressed. It is best to encourage them to seek out counselling, preferably from an experienced therapist [19].

DISCUSSION

Post-surgery, vaginal stents are used to preserve the depth, width, length, and patency of the newly formed neovaginal structure and to avoid its contraction or shrinkage. They also function as a haemostatic agent. According to the results of a comprehensive review, stents or dilators are advantageous and improve the wellbeing of women who have a history of stenosis. Several different materials for vaginal stent fabrication are evolving since years earlier sterile gauze, candle wax, vulcanized rubber, Styrofoam, silicone foam have been used with advancement in the material nowadays silicone fabricated stent has gained a popularity also vaginal stent with surface coatings enhance biocompatibility and promote tissue integration. Every material has some of the drawbacks to it that need to be addressed with taking into consideration physical, mental, emotional well-being of the patient. Vaginal stents should be designed for maximum, long-term therapeutic results rather than temporary, anatomical fit. The stents need to be made up of non-porous material that is easy to clean after each use. Stents that are rigid

can cause contracture formation and graft loss or fibrosis and also pressure related bladder or rectum perforations. The frequency of these complications has dropped with the use of soft stents. It should be fabricated exactly talking into consideration the vaginal length and diameter with slight curved and tapered tip that is helpful for easy insertion and removal of the stent. The stents should improve graft take, should be simple to replicate, practical, economical, and time-efficient. It should be biocompatible causing no harm to the tissue as vagina is lined by stratified squamous, non-keratinizing epithelium lining that is thin and distensible. Studies on self-fitting vaginal stents based on Shape Memory Polymers are ongoing. With the use of SMPs, material properties—such as transition temperature, Young's modulus, and maximum elongation—can be more precisely tailored to satisfy functional engineering requirements. With restoring the normal anatomy, the psychological conditions of the patient should be taken into utmost consideration. The stent mainly serve the purpose of maintaining the surgically created neovagina after vaginal reconstruction by preventing fibrosis but while doing so it should not cause any discomfort to the patient and hence should improve patients overall quality of life. Before surgery, it is imperative to advise all patients that dilator therapy should be started as soon as possible to prevent stenosis. As a result, before to surgery, patients must be evaluated for dilation readiness. Though a lot of research has been done on intraoperative procedure, not much has been written about the best time or length of time for postoperative stenting. Vaginal stents are usually left in place postoperatively for vaginoplasty treatments that necessitate grafts or significant mobilization of the native vagina. Patients are advised to either wear a stent continuously for three to six months after being discharged, or to wear a stent while sleeping at first. After surgery, careful monitoring is required. Patients should be encouraged to return as soon as possible after five days of the surgery at then after regular interval of 2 weeks, 4 weeks and 8 weeks. By implementing effective maintenance strategies, optimizing stent design, and prioritizing patient-centred care, clinicians can enhance the functionality of vaginal stents and improve overall treatment success rates

CONCLUSION

Vaginal stents have a number of difficulties and consequences that need to be carefully managed and observed, despite of their therapeutic advantages. To maximize treatment outcomes and patient satisfaction, clinicians should evaluate the risks and benefits of stent therapy on a case-by-case basis and be alert when addressing patient concerns and adverse events. Future vaginal stent designs will need to be safer and more tolerable, which will require additional studies and technology developments. Continued innovation, interdisciplinary collaboration, and patient-centred approaches are crucial for harnessing the full potential of advanced vaginal stents in improving women's health outcomes and quality of life.

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