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Pelvic Organ Prolapse – General Overview and Latest Therapy Possibilities

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Abstract

Pelvic organ prolapse (POP) is a very common health problem, which affects increasing number of women. The etiology involves multiple factors, especially ageing or increased abdominal pressure. It refers to the downward displacement of the pelvic organs and its protrusion. This condition can significantly affect the quality of life, causing urinary and fecal incontinence, sexual dysfunctions and self-consciousness. The examination includes both physical and imaging studies. Patients can be offered an observations, pessaries and surgeries, such as obliterative and reconstructive surgeries. A literature for this review was gathered on PubMed

and Google Scholar, using keyword “pelvic organ prolapse”, combined with “epidemiology”, “pathophysiology”, “risk factors”, “symptoms”, “complications”, “treatment”, “surgery” and “pessaries”.

Key words: pelvic organ prolapse, surgery, pessaries, sacrocolpopexy

Introduction

Pelvic organ prolapse (POP) is a very common condition of women and it significantly affects their quality of life. This disease affects over 41% to 50 % woman in the world, but only about 3% are symptomatic [2,4]. It is defined as a downward descent of the pelvic organs that results in a protrusion of the vagina, uterus, or both. [1] Prevalence increases with age, and as society ages, this will become an increasingly common problem. [3]. The etiology of POP is associated with ligament or muscular weakness, to which can lead pregnancy, vaginal delivery, pelvic surgeries, hysterectomy or increased intraabdominal pressure, caused by heavy lifting, obesity, chronic cough, and frequent constipation. [2,3] Treatment options include observation, vaginal pessaries, and surgery. [3] The purpose of this article is too raise awareness of this common condition and to present what treatment can be used to improve the quality of patients’ lives.

Materials and methods

This review aims to explore the current knowledge on pelvic organ prolapse, especially about latest treatment possibilities. This article gathers information from publications available on PubMed and Google Scholar. The keyword used in search was “pelvic organ prolapse”, combined with “epidemiology”, “pathophysiology”, “risk factors”, “symptoms”, “complications”, “treatment”, “surgery” and “pessaries”. The collected materials were used to provide an overview of basic information about pelvic organ prolapse and discuss the latest treatments. Review articles, bibliographic studies, cohort studies, and meta-analyses were included.

Epidemiology

Determining the exact prevalence of POP is challenging. According to various studies, 41-50% of women develop POP, but only about 3% are symptomatic, which explains the results of different questionnaire-based studies. The remaining group of women shows only anatomical changes in the examination. [2,4]

Between 2005 and 2006 performed a National Health and Nutrition Examination Survey, a nationally representative survey of the US noninstitutionalized population with a result of 2,9% women experiencing symptomatic POP. The research participants were also examined, which showed that up to 75% of women exhibit some signs of prolapse. [7]

In 2005, a questionnaire was conducted on a population of Swedish women. The study showed that 8.3% of the respondents reported experiencing symptoms of POP and the prevalence increased with age, indicating a result of 4,1% in the age group of 30-39, 6,2% in the age group of 40-49, 11,8% in the age group of 50-59, 12,2% in the age group of 60-69 and 11,0% in the age group of 70-79. [5]

Another questionnaire survey, conducted on Women ≥ 18 years old attending the 2018 Minnesota State Fair revealed the occurrence rate of symptomatic POP at 4.9%. [6]

The study carried out on the female population in Western Australia between 1981 and 2005 found that the lifetime risk of surgery for POP is 19%. [8] Each year, in United States there are performed about 300,000 POP surgeries. [8,9]

Risk factors and pathophysiology

As the society ages, POP is becoming more common health issue. That is why it is important to know what the risk factors for POP are, to help to prevent this disease and its complications. The primary factor of POP is degeneration of connective tissue, which results in pelvic organs descending and eventually their herniation through vaginal walls. Ability to repair collagen is encoded in the genes. [4] In the meta-analysis from 2014, it was found that there is a statistically significant correlation between collagen type 3 alpha 1 (COL3A1) rs1800255 genotype AA and POP among women in Asia and the Netherlands. [17] The research have also showed that joint hypermobility, Marfan Syndrome and Ehlers-Danlos syndrome are initial factors for POP. [4,16]

A meta-analysis based on data from 47,429 women collected between 2014 and 2021, highlights several groups of risk factors, such as obstetrical, lifestyle, unmodifiable, social, surgical, pelvic floor factors and comorbidity. Among the obstetrical factors, birthweight per 100 grams and age at first delivery above 30 years old compering to the age of ≥24, showed statistically significant correlation. Parity and vaginal delivery were classified as the confirmed risk factors. Additionally, parity of 2 and more, compared with 0-1, was also significant risk

factor. Furthermore, caesarean delivery was reported to have a significant protective effect. BMI and age were also found a significant risk factor, in the contrast to smoking, which had a significant protective impact. However, no correlation was found between ethnicity, menopausal status, constipation or hysterectomy and POP. Higher education seems to have a preventive impact on developing POP, but this requires further investigation. In the context of pelvic floor factor, levator defect showed statically significant correlation to POP and an increased levator hiatal area on Valsalva maneuver is a confirmed risk factor. [10] It has also been found, that the forceps delivery and perineal lacerations increase the risk of POP. No evidence were discovered, that episiotomy have an impact on developing POP. [19]
The questionnaire conducted on Woman ≥ 18 years old attending the 2018 Minnesota State Fair also showed that POP was significantly associated with parity and higher BMI. [6] It another research it was studied as well, that 77% of overweight women suffered from POP, while 45% did not. Additionally, there was found, that obesity was significantly connected with POP, increasing its occurrence by 31% in the case of uterine prolapse, 38% in the case of rectocele and by 39% in the case of cystocele. Furthermore, being overweight was significantly associated with increasing prevalence of these types of prolapse respectively by 40%, 75% and 57%. [27]

From another perspective, menopause has been observed to have an influence on developing POP, not only due to the process of ageing and possibly higher parity of older women, but due to the decrease of the estrogen levels as well, which causes collagen to weaken. [4,20] A study conducted on nulliparous, multiparous, and pre- and post-menopausal women showed, that menopause is an independent risk factor for developing prolapse which protruded outside the hymen. [21]

On the contrary, some studies have showed, that there is a connection between constipation, activities causing increased intraabdominal pressure such as chronic cough, heavy lifting, long periods of standing or jumping from high altitudes and POP. [11] Additionally, a cohort study conducted on data collected by The Swedish Inpatient Register from 1973 to 2003, has proved a thesis that hysterectomy is associated with an increased risk of POP. Furthermore, the different types of hysterectomy were compered, concluding that the vaginal hysterectomy has the highest probability of causing POP. No differences were found between subtotal and total hysterectomy in leading to POP. This study could not confirm a relationship between level of education and developing POP. [18]

It has been shown, that a family history of POP increases the likelihood of this condition by 2,58 times. [15]

The study published in 2024 revealed, that there is a relation between POP and striae, although this topic requires further investigation. [12]

Symptoms and complications

As most patients, who developed POP, are not symptomatic, those who exhibit symptoms, have lower quality of life. The main symptoms of POP are a bulge protruding from the vagina or the feeling of pelvic pressure. Women suffering from POP can develop other pelvic floor conditions, such as urinary incontinence, overactive bladder, fecal incontinence and pain during defecation. [2, 22, 23] Number of women may notice that their symptoms intensify as the day progresses and with increased physical activity, but tend to enhance when they take a rest. [22] POP can relate to different compartments of the pelvic organs. Prolapse of the bladder into the vaginal canal is caused by anterior vaginal wall prolapse (cystocele). If we are dealing with posterior wall prolapse, we can examine rectal (rectocele) or small intestine (enterocele) protrusion, and with vaginal vault prolapse, the descent of the uterus, cervix, or apex of the vagina. [2] Depending on which compartment the issue affect, or how many, the symptoms may be different. Cystocele may present with difficulty urinating or the sensation of incomplete bladder emptying, urinary incontinence, especially during coughing, sneezing, lifting heavy objects, or physical activity, frequent urination or the sensation of urgency to urinate and urinary tract infections caused by urinary retention. Patients sometimes describe a need to push the prolapse back to the vaginal canal in order to empty the bladder completely. Rectocele, similar to cystocele, can manifest in feeling of partial stool evacuation, because of its blockage in the prolapse and vaginal or perineal pressing may help to release it. Patients may also suffer from sexual dysfunction, such as dyspareunia, inability to engage in sexual intercourse due to anatomical barriers or insufficient vaginal lubrication. [22]

Most diseases affect not only the physical health, but also mental health and eventually quality of life. Case-control study showed that patients with POP were more likely to feel self-conscious, less likely to perceive themselves as physically and sexually attractive and less likely to feel feminine. The dissatisfaction with their body image negatively affected the perception of their appearance when dressed or naked, which resulted in avoiding people and ultimately in lower quality of life on both physical and mental scales. [13] A questionnaire study conducted in 2001 revealed, that in the group of patients with POP, the sexual activity was less frequent and they were more likely to restrict their sexual activity because of the fear of incontinence.

They also reported suffering symptoms during sexual intercourse, such as dyspareunia or vaginal dryness more often than the patients without POP. [14]

Examination

When POP is considered, an abdominal and pelvic examination should be performed. In the abdominal examination, the masses, hernias and surgical scars are searched for. Pelvic examination is carried on in the dorsal lithotomy position, which is the supine position with legs elevated and spread apart. It consists of assessment of the vulva and dermal inflammation or ulcers, vaginal epithelium and its signs of low levels of estrogen, such as abrasion and wounds, caused by vaginal dryness; pelvic floor muscles, palpating for its tenderness and weakness, bulges, prolapse and urinary incontinence. Patients can be asked to perform Valsalva maneuver, in which patient forcefully exhales against a closed airway, typically by closing the mouth and pinching the nose shut, or coughs, which increases pressure in the chest and abdominal cavities. This enables the evaluation of stress urinary incontinence and reveal the prolapse. [22] The extent of the prolapse should be examined as well, both in the supine and standing position, to assess the stage of the prolapse. In the supine position, using speculum, the vaginal apex is envisioned and the Valsalva maneuver is repeated. Removing the speculum, the apical descent is examined. To evaluate the anterior and posterior walls, a one-blade speculum is applied. To assess the stage of POP, the Baden-Walker Grading System or Pelvic Organ Prolapse Quantification Staging System (POP-Q) may be used. In both systems, stage 0 is no prolapse. Stage 1 in the Baden-Walker system the descent is halfway to the hymen and in the POP-Q the most distal part of prolapse is more than 1 cm above the hymeneal ring. Stage 2 refers to the descent to the hymen in Baden-Walker system and in the POP-Q the most distal part of the prolapse is >1 cm proximal or distal to the hymeneal ring. Stage 3 applies to the descent halfway past the hymen in the Baden-Walker system and in the POP-Q the most distal part of the prolapse is greater than 1 cm below the plane of the hymen, but protruding no further than 2 cm than total vaginal length. The last stage is stage 4, which concerns the maximal possible descent for each side in the Baden-Walker system and in the POP-Q the complete eversion of the lower genital tract. Additionally it is also important to check for infections, presence of blood in the urine and post-void bladder emptying level, using for example ultrasound probe or catheter. [3, 22, 25]

To assess the presence of POP, the imaging and other studies are also helpful and valuable. The urodynamic tests may be used to assess the amount of urine left in the bladder after urination.

If presence of blood in urine was detected, cystoscopy may be performed. Anal manometry, which measures pressure in the rectum, may be thought of in patients with simultaneous bowel dysfunctions. Ultrasound can also be used to evaluate the pelvic floor muscles dysfunctions. [22]

In 2003, Deval and colleagues performed a study to evaluate, whether dynamic MRI could be used as an alternative to dynamic cystoproctography for the examination of pelvic organ prolapse. Considering the MRI, its sensitivity for cystocele was 70%, for vaginal vault or uterine prolapse 42%, for enterocele 100% and for rectocele 87%. When it comes to the MRI's specificity, it amounted to 100% for cystocele, 81% for vaginal vault and uterine prolapse, 83% for enterocele and 72% for rectocele. Regarding the positive predictive value of MRI, it stood at 100% for cystocele, 60% for vaginal vault or uterine prolapse, 75% for enterocele and 66% for rectocele. They concluded, that MRI is a valuable addition to the examination of women's pelvis, highlighting its accuracy in the confirming POP, except for vaginal vault and uterine prolapse. Dynamic MRI seems to be quick, non-traumatic and financially efficient, allowing for safe and anatomically accurate visualization of the whole pelvis. Intra-operative findings still remain a gold standard for evaluating POP. [24]

Treatment

Although POP is a mild condition, it may significantly affect patients' quality of life. What can be offered to patients with POP is observation, pessaries and surgeries. Type of treatment depends on the severity of symptoms and how much they interfere with patients life.

The majority of patients do not necessitate treatment, but there are some contraindications to the expectant management, such as swelling of the ureter (hydroureter) or the renal pelvis and calyces (hydronephrosis), as well as ureteral reflux and recurrent urinary tract infections due to a blockage in the normal flow of urine caused by bladder descent, and also vaginal or cervix erosion and infections. What can be beneficial and safe in all patients with POP, regardless of the chosen treatment method, is to influence modifiable risk factors through for instance giving up smoking or reducing weight, avoidance of heavy lifting and jumping or prevention of constipation, by changing the diet, increasing fibre intake and hydration or limiting high-fat and processed foods. [25] If the patient does not experience symptoms of POP or the symptoms are benign, observation is the safe option. During the observation period, it is important to annually assess the progression of POP and make the decision to change a treatment method if the need arises. In the case of patients after the childbirth with POP in the examination, it is also safe to wait and observe, because it is highly likely to improve within the first year after the delivery.

[22] In patients, who suffer from vaginal dryness and erosion due to the prolapse, there is an option of using vaginal estrogens. [30]

Pelvic muscle training exercises (Kegel's method) are also a conservative method of improving function of the pelvic muscles by their systematic contractions and consequently improving the problem of urinary incontinence. Nevertheless, it is important to note that this method does not cure or reverse POP. To achieve satisfactory results, it is important to perform 45 to 60 exercises per day, split into two or three sets. [3] In the cross sectional study conducted in 2003 on 682 elderly woman living in Bangkok, compering two groups of women, those who exercised pelvic floor muscles for 2 years and those, who did not, concluded that the exercises were statistically significant in preventing the worsening of POP, achieving the results of worsening rate at 27.3% in the group, who exercised and 72.2% in the control group. [28] In the review study performed between 1996 and 2021 to assess, if exercising programs other that a classic pelvic floor muscle training (PFMT), for example hypopressive exercise, yoga or breathing and hip muscle exercises in an inverted position, were not significantly useful in improving the effect added to a classic pelvic muscle training and performed alone had also worse effect compering to PFMT. [29]

Another successful treatment method is using pessaries, which are silicone tools inserted into the vagina. They help with prolapse symptoms, supporting pelvic organs. They are eventually used by about 66% of patients with POP, and about 77% expressed a willingness to continue the pessary use after one year. What is important, they are a good option for treatment all stages of prolapse, as well as stress urinary incontinence, helping to cease the development of POP and postpone or even avoid the requirement for surgery. [3] Research showed, that pessaries can improve symptoms of prolapse in 71% to 90%. They are designed so that the patient is able to walk, sit, void, be sexually active and be comfortable. [3, 25] To make this happen, the pessary must be properly fitted. The pelvic examination is performed and the vaginal measurements are taken. There are several types of pessaries available. There are supportive and space-occupying. The most common is the ring pessary, which is a supportive pessary and it is best suited for mild stages of prolapse. The Gellhorn pessaries, space-occupying device, are selected in the later stages of prolapse. However, the PESSRI trial, compering the ring and Gellhorn pessaries, showed no difference between the two of them in managing patient symptoms. The patient is taught, how to correctly insert, remove and clean the pessary. Usually, they are removed every night and inserted in the morning, but it is also possible to do so every week, two weeks or even once a month. Patients should come for a follow-up appointment after

one to two weeks to evaluate the accuracy of the pessary selection. Then, they can be observed annually. In patients with reduced vaginal length, wide vaginal opening and history of hysterectomy, there is a risk that an appropriate pessary may not be successfully fitted. [3, 22] The most common complications of pessary use are vaginal discharge, irritation, erosion of the vaginal epithelium, ulceration, bleeding or pain. Usually it occurs in postmenopausal women, who have lower levels of estrogen and suffer from insufficient vaginal lubrication. It may be easily managed with vaginal estrogen creams and temporary discontinuation of pessary use. It has been observed, that the support pessaries are linked to reduced vaginal discharge and irritation compared to space-occupying pessaries. It is important to correctly insert, remove and clean the pessary, as neglecting this can lead to more serious consequences. It was reported, that up to 30% of patient using pessaries suffers from bacterial vaginosis and it is more prevalent in patients, who remove their pessaries less frequently. More serious complications include pessary impaction, which may require surgical removal, rectovaginal or vesicovaginal fistula formation, leading to necrosis and urosepsis. Therefore, it is important not to prescribe pessaries to patients with dementia and who are unlikely to follow the recommendations and **c**arefully monitor the patients' condition**,** adherence to hygiene guidelines and regularly check the use of the pessary to minimize the likelihood of these complications. [3, 22, 25]

Surgery is usually the last-line treatment, for patients with more advanced stages, unsatisfactory results of conservative treatment and progressed symptoms significantly affecting quality of life. There are several options for surgical treatment of POP, such as obliterative, which closes the vaginal canal, and reconstructive surgeries. They may include hysterectomy or uterine conservation (hysteropexy). The method, which offers the highest cure rate and lowest morbidity is vaginal obliteration (colpocleisis), but it is reserved for patients who do not intend to be sexually active by vaginal intercourse. For those, who wish to preserve coital function, reconstructive surgery is recommended. The vaginal apex can be supported using the native tissue repair or by placing a mesh to suspend the top of the vagina to the sacrum, either via an abdominal approach, by open or laparoscopic surgery (sacrocolpopexy), or a transvaginal approach (transvaginal mesh). For the anterior prolapse, an anterior colporrhaphy can be offered and for the posterior prolapse, a posterior colpoperineorrhaphy. Diagnosing coexisting abnormalities is crucial in planning reconstructive procedures to minimize the risks of recurrence and the need for reoperation. The American Urogynecologic Society and American College of Obstetricians and Gynecologists states, that transvaginal mesh for POP should be

reserved for patients with advanced or recurrent prolapse or medical conditions that render more invasive and prolonged open or endoscopic procedures too high-risk. [3]

In autologous reconstructive surgery usually are used fascia lata and anterior rectal fascia. Research have concluded, that sacrocolpopexy procedure with fascia lata has better outcome in the treatment of prolapse than those with rectus fascia. [34] Vaginal mesh implantation has been found to be a simpler surgical procedure in comparison with autologous fascia pelvic floor reconstruction and to have a ability for repairing both central and lateral defects. [32] In a systematic review performed in 2009, it has been showed that total reoperation rates for prolapse recurrence were highest in the traditional vaginal surgery group, 4%, and in the vaginal mesh group only 1,3%, but this group had the highest total reoperation rate at 8,5%, due to the more common complications, for example mesh degeneration or infections. [26] However, latest studies have worked on improvement of materials and creating bioengineered grafts and meshes used in reconstructive surgeries to make them more compatible with native tissues, thereby avoiding these complications. These innovative materials offer the potential for improved support and better integration with human tissue, which could enhance long-term outcomes. [32] Another latest advancement is 3D Printed Biodegradable Mesh with Antimicrobial Properties, which is made of degradable polycaprolactone or polyethylene glycol, fabricated with melt-electrowriting and coated with azytromycin. Results suggest that these meshes will serve as an effective anti-infective device when initially implanted in patients. After approximately two weeks of drug release, the mesh will support cell attachment and proliferation. These meshes show potential as an effective treatment option for POP, potentially overcoming the challenges associated with traditional polypropylene meshes. [33]

In meta-analysis from 2024, compering laparoscopic pectopexy and laparoscopic sacrocolpopexy, concluded that laparoscopic pectopexy had shorter average operation time, lower average bleeding volume, shorter indwelling catheterization time and fewer total postoperative complications and postoperative prolapse recurrences than laparoscopic sacrocolpopexy. [31] Another study comparing robotic or laparoscopic sacrohysteropexy and open sacrohysteropexy shows, that robotic and laparoscopic sacrohysteropexy had shorter operating time, less operative bleeding and had better results in postoperative symptoms. No differences were found in postoperative complications and patients' overall satisfaction. [35] Additionally, the randomized, controlled trial compered laparoscopic sacrocolpopexy and abdominal sacrocolpopexy, concluding that treating with laparoscopic sacrocolpopexy was

significantly associated with earlier recurrence, mostly in the first 12 months after the surgery, but overall it has as good results as abdominal sacrocolpopexy in treating POP, except for anterior POP. [36]

Laser therapy typically used for dermal repair and connective tissue remodelling, in the recent years has gained popularity in treating POP and stress urinary incontinence, but yet there is insufficient evidence to justify the use of this technique. The European Board and College of Obstetrics and Gynaecology requires high-quality evidence before incorporating it into routine clinical practice. [30]

Conclusions

Pelvic organ prolapse is a very common health issue and while being benign, it can significantly affect patients' quality of life. It can affect up to 50% of population of women, while only about 3% are symptomatic. POP is associated with degeneration of connective tissue. Prevalence increases with age, and as society ages, this will become an increasingly common problem. The risk factor of POP are pregnancy, vaginal delivery, pelvic surgeries, hysterectomy or increased intraabdominal pressure, caused by heavy lifting, obesity, chronic cough, and frequent constipation. It is important to influence modifiable risk factors through giving up smoking or reducing weight, avoidance of heavy lifting, jumping and prevention of constipation. Patients can be offered observation, pessaries, pelvic muscle training exercises or surgery treatment, such as obliterative or reconstructive ones, using the native tissue repair or a mesh, either via an abdominal approach, by open or laparoscopic surgery, or a transvaginal approach. The laser therapy is not recommended yet because of the lack of evidence. The treatment method chosen will depend on the symptoms, stage of POP and comorbidities. Latest studies have worked on improvement of materials and creating bioengineered meshes used in reconstructive surgeries to make them more compatible with native tissues, thereby avoiding complications associated with traditional meshes. With a growing focus on minimally invasive techniques, advanced materials, and a better understanding of pelvic floor anatomy and function, pelvic organ prolapse surgery is rapidly evolving. These advancements hold the promise of improved patient outcomes, marking the beginning of a new era in the treatment of this complex condition.

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