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Review Article

"Methods for enhancing surgical results in the current care of pelvic organ prolapse"

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INTRODUCTION

The descent of one or more of the uterus, the anterior or posterior vaginal walls, or the apex of the vagina (vaginal vault following hysterectomy) is known as pelvic organ prolapse (POP) [1]. POP is discovered during vaginal examinations in 40% to 60% of pregnant women; the anterior and posterior compartments are the most often repaired areas [2]. A POP repair is thought to have a lifetime risk for women of 12.6% [3]. Current POP surgery research suggests that in addition to evaluating composite success by objective results, one should also include subjective symptomatic outcomes, reoperation rates, and comorbidities. Given the characteristics of POP and concerns about native tissue healing and consequences, it is more crucial to increase patient satisfaction and decrease problems than to achieve anatomic success. and Food and Drug Administration (FDA) cautions. The utilisation of laparoscopic and robotic techniques for POP repair has expanded with the acceptance of less invasive surgery. This article's goal is to examine the current state of the art in POP surgery.

ANTERIOR COMPARTMENT PROLAPSE SURGERY

There are various treatment of options for anterior compartment prolapse, including conservative management, pessaries, or surgical reconstruction. Unfortunately, there is no standard surgical treatment for anterior prolapse and it is crucial to discuss the risks and benefits of different surgical options with each patient. Generally, reconstruction of the anterior vaginal wall is performed by placing sutures further indigenous approaches have been used to further augment tissue and boost durability. that plicate and lessen the weaker tissues. Native tissue healing has undergone extensive research, despite having lower success rates than mesh-augmented repair. Native repair is helpful for minimising prolapse inside the vagina and treating symptoms of vaginal bulge, according to the most recent composite criteria of success.

Depending on how one defines therapeutic success, the success rate of POP surgery might range from 19.2% to 97.2%. As a result, it is challenging to compare outcomes due to differences in patient characteristics, surgical methods, and success criteria. During the past 15 years, the pelvic organ prolapse quantification (POPQ) method has been demonstrated to be an important measuring instrument that has enhanced our understanding of POP and permitted trustworthy evaluations of the anatomical success of POP procedures. The definition of "optimal anatomic outcome" was determined to require perfect anatomic support (POPQ stage 0) at a 2001 NIH workshop for the standardised terminology among pelvic floor disorder researchers, and the definition of "satisfactory anatomic outcome" required support higher than 1 cm proximal to the hymen. The term "cure" was defined as a successful or ideal anatomic result.

However, it has been argued that these anatomic categories are overly restrictive because more than 75% of women who have yearly exams do not exhibit POP symptoms.

over 40% of patients would not satisfy the standards for "acceptable anatomic result," and approximately 60% of patients would not meet the standards for "ideal anatomic outcome" [4]. Stage 2 has also been split into stage 2a (hymen to -1 cm) and stage 2b (hymen to 1 cm). While less strict criteria for defining "cure" are increasingly being discussed, several studies recently defined Ba point 0 as anatomical success.

Barber et al. [5] found that the highest correlation between patient ratings of overall improvement and treatment effectiveness and the absence of vaginal bulge symptoms.

Moreover, definitions based on patient assessments of outcomes and anatomic success revealed weak or no connections. Maximizing

patient happiness while restoring the pelvic organs to their original placements are the two objectives of surgical repair [6].

1. Anatomical success

A randomised controlled research comparing the outcomes of anterior colporrhaphy (AC) and mesh repair over the previous 10 years is summarised in Table 1 [7-23].

Results for AC varied from 39.5% to 75% when anatomic success was determined as obtaining a POPQ stage 0 or 1.

while mesh repair had superior results at a 1-year follow-up, ranging from 81.0% to 95% [7,8,10,13,15-18]. The findings of the mid-term follow-up (24–36 months) showed that mesh repair outperformed AC in the majority of trials [9,12,14,20,22], with outcomes ranging from 39.5% to 86% for AC and 39.5% to 91.4% for mesh repair.

Different outcomes are obtained when anatomic success is defined as "No descent beyond the hymen (Ba 0)". According to certain studies, AC had anatomic success rates as high as 86% to 89%, which was comparable to the mesh repair success rates of 84% to 96% [11,21,23]. Nevertheless, the success rate for mesh repair (86.4%) was higher than that for AC repair (70.4%) in patients with severe POP (POPQ stages 3-4) (p=0.019) [19].

2. Manifested success

Improvements in quality of life and patient satisfaction are increasingly viewed as more crucial variables than morphological achievement alone when redefining the success of POP surgery. While morphological success alone does not guarantee that vaginal bulge symptoms remain a meaningful outcome evaluation tool following POP surgery, it does show a substantial correlation between patient assessments of overall improvement and improvement in quality of life after surgery [5]. With the help of several indicators, including the lack of vaginal bulge symptoms and other forms of validated questionnaires, multiple randomised trials have looked at symptomatic success (Table 1). When vaginal bulge symptoms were used as the measure of symptomatic success, symptoms persisted in 0% to 37.9% of patients following AC, and superior to that in the mesh repair group, while the remaining tests revealed no evidence of bulging problems.

There are considerable variations between mesh repair and AC. According to a 2016 Cochrane analysis of anterior compartment prolapse, mesh repair significantly reduced the likelihood of prolapse awareness compared to AC (risk ratio [RR], 0.56; 95% confidence interval [CI], 0.43-0.73) [24]. The majority of quality-of-life surveys did, however, significantly improve following both procedures, with no discernible difference between AC and mesh repair in terms of improvement [7,12,13,19,20,23]. Despite mesh repair having a higher anatomic success rate, AC provides some benefits for quality of life. Therefore, while treating anterior compartment prolapse, mesh should be taken into consideration in order to 3. Concerns with mesh: Is synthetic mesh actually harmful? For the past ten years, there has been scholarly discussion over the use of transvaginal mesh. kits for vaginal mesh were Following receiving FDA approval in 2001 for POP repair, the product was initially made available in the USA in 2005. The vaginal mesh-kit is a simple tool used in POP to supplement natural tissue.

The mesh typically has four arms and a main body and may successfully cover both paravaginal and central abnormalities. These standardised kits mark a change from patient anatomy assessments that are done on an individual basis [10]. Meshkits have shown a meteoric rise in clinical use since their release into the market, outpacing the accumulation of assessments of their long-term safety. Sung et al. [25] examined studies in 2008.

There is inadequate data to support the claim that transvaginal mesh improves POP outcomes as compared to native tissue for POP repair. The evaluation of mesh-related adverse events included looking at fistula development (1%), visceral damage (1%–4%), urinary tract infection (0%–19%), and erosion (0%–30%). Overall, the outcomes showed that carefully planned and Randomized studies that are appropriately powered are required. Apical augmentation using transvaginal mesh had positive surgical results, with mesh erosion being the most frequent consequence, occurring in 4.6% to 10.7% of patients, according to Feiner et al[26] .'s assessment of success and problems in all trials to date that employed transvaginal mesh. The FDA initially alerted the public about potential health risks connected with transvaginal mesh for POP repair in 2008. Mesh degradation rates of 2% to 25% for anterior POP surgery and mesh-related infection rates of up to 8% were reported by Bako and Dhar [27] in 2009. The FDA updated the 2008 notice with the following safety statement in 2011 [28].Understand that POP can typically be properly treated without mesh, therefore preventing mesh-related issues.Only choose for mesh surgery after assessing its risks and advantages against all other surgical and nonsurgical options.

3. Before to putting mesh, take into account the following

A mesh procedure may put the patient at risk for needing additional surgery or for the emergence of new complications. Removal of mesh may require multiple surgeries and significantly reduce the patient's quality of life. Surgical mesh is a

permanent implant that may make future repairs more difficult. Full removal might not be feasible and might not resolve issues like discomfort. Mesh positioned abdominally might lead to decreased risks of infection.Compared to transvaginal mesh installation, mesh problems exist.

Explain to the patient the advantages and hazards of nonsurgical procedures, non-mesh surgery, abdominally inserted mesh, and their likelihood of success in comparison to transvaginal mesh implantation. Inform the patient if mesh will be utilised during her POP procedure and offer details on the precise product that will be used. Make sure the patient is aware of the postoperative dangers and problems of mesh surgery as well as the scant information on long-term outcomes.

The FDA came to the conclusion that transvaginal mesh had a greater complication rate than transabdominal mesh in response to an increase in reports of adverse events. 2012 saw the FDA ordered mesh producers to carry out post-market surveillance tests to assess effectiveness and safety. Surgical mesh for POP was eventually reclassified by the FDA in 2014 as a class 3 (high-risk) device, and the reclassification was legally put into effect in January 2016. According to one study, rates of minimally invasive procedures like laparoscopic or robotic sacral colpopexy or native tissue repair increased while vaginal mesh repairs decreased from 27% of POP repairs before 2008 to 15% after the first FDA notification in 2008 and 5% after the second notification in 2011 [29]. Finally, in April 2019, the FDA prohibited the sale of transvaginal mesh for POP. Mesh items used to treat other diseases like hernias or incontinence are not covered by it. The state of things in Europe with relation to Meshes are still used in POP correction. The Medicines and Healthcare Products Regulatory Agency (MHRA) published an official statement on mesh for POP surgery in 2014, stating that mesh is safe and effective for the majority of patients and that further research should be done on implant kinds and surgical procedures. Mesh should be taken into consideration as a last resort for POP repair, according to the National Institute for Health and Care Excellence's (NICE) official release in April 2019. Moreover, it is advised that the patient be thoroughly informed of the results and the potential for mesh complications while utilising a mesh [30]. Is it harmful to use synthetic mesh? It's critical to not misinterpret the FDA's caution. Recent randomised controlled trials and singlearm studies both report mesh exposure rates ranging from 3.2% to 20.5% and 3.1% to 14.4%, respectively. The danger associated with utilising synthetic mesh for POP cannot be assessed since mesh degradation rates differ between investigations. The midurethral sling mesh degradation rates in SUI patients differ from study to study as well. The mesh erosion rate of the retropubic method was 11.4% (24/210) and that of the transobturator approach was 25.7% (18/70) in a research that included 388 complications [31], which were somewhat higher than the average mesh erosion rate of midurethral slings (3%–5%) [32]. Midurethral slings are not regarded as dangerous, even though greater complication rates are documented. Moreover, the majority of cases of mesh exposure are asymptomatic, and conservative therapy is likely to alleviate symptoms. Only 50% of patients with mesh exposure required surgical intervention, ranging from 0% to 16.4% of patients in randomised controlled trials [7-10,12-23] and 1.7% to 8.9% in single-arm studies [33-37].

4. The significance of concomitant apical prolapse correction

After POP surgery, apical prolapse must be found and corrected in order to lower recurrence. Almost all instances of both anterior and posterior compartment prolapse have clinically substantial apical prolapse. 80% of vaginal apices prolapsed to at least 2 cm within the hymen and 55% of apices prolapsed >2 cm outside the hymen if the anterior vaginal wall was at least 2 cm outside the hymen [39]. Another study discovered that apical vaginal descent was clinically significant in nearly 60% of individuals with stage 2 or higher cystoceles. The prognostic significance of apical prolapse rises with cystocele stage [40]. A research comparing isolated anterior repair to combined anterior and apical repair in over 2,700 women revealed that 10-year reoperation was more common with the former.

The combined anterior and apical repair group had lower rates (11.6% vs. 20.2%) [41]. In addition to a basic association between apical support and anterior support, these findings serve as a foundation for reducing recurrences. For anterior compartment prolapse cases to be successfully treated, the vaginal apex must be suspended properly. There are surgeons who do anterior compartment repair without first carefully examining the vagina, despite the fact that contemporaneous apical repair is an evident modifiable factor that can lower the chance of recurrence.The percentage of anterior repairs without apical suspension declined from 77.7% in 2004 to 41.4% in 2012, according to US statistics (p0.001). There has been a decline since 2011

APICAL VAGINAL PROLAPSE SURGERY

Surgery for apical prolapse can be roughly divided into obliterative and restorative methods. Restorative methods might be used abdominally or transvaginally.

Abdominal sacrocolpopexy continues to be the gold standard

for patients seeking restorative results. Robot assisted-laparoscopic sacrocolpopexy (RALS) and standard laparoscopic sacrocolpopexy (LSC) are three ways to execute abdominal sacrocolpopexy (RSC). In a recent Cochrane review, [43] sacrocolpopexy, including open and laparoscopic approaches, was associated with a lower risk of prolapse awareness, recurrent prolapse, repeat surgery for prolapse, postoperative stress urinary incontinence, and dyspareunia than a variety of vaginal approaches (RR, 2.11; 95% CI, 1.06-4.21), recurrent prolapse (RR, 2.28; 95% CI,

1. Open sacrocolpopexy versus laparoscopic/robotic sacrocolpopexy

Although open sacrocolpopexy is an excellent alternative for treating apical prolapse repair and has long-term success rates of 78% to 100%, it is more expensive, requires more analgesics, and requires a longer hospital stay than transvaginal surgeries [44,45]. These restrictions have been solved by the development of new surgical methods including LSC and RSC. LSC or RSC had better anatomical durability and lower overall morbidity when compared to open sacrocolpopexy [46–52]. In a randomised research, Freeman et al. [47] compared open sacrocolpopexy with LSC in patients with vault prolapse and discovered that the procedures had clinically identical 1-year recurrence rates. The longest randomised follow-up research comparing open sacrocolpopexy with LSC was undertaken by Costantini et al. [52] in 2016 and concluded that No patients in their sample experienced apical recurrences, demonstrating the effectiveness of both procedures. For repeat surgery for prolapse, the 2016 Cochrane review [43] found that there might not be a difference in outcomes between LSC and open sacrocolpopexy (RR, 1.04; 95% CI, 0.16-6.80).

Although open sacrocolpopexy appears to be improved upon by LSC, LSC is technically more difficult for people who are not skilled in laparoscopy. Having RLC in place since 2004 has made it possible for surgeons with high dexterity and precision to do the surgery instead of LSC. Without the requirement for laparoscopic expertise, the learning curve is manageable. The anatomical success rate for one of the biggest prospective trials of RSC (n=120) was 89% after a year of follow-up [53]. A recent systematic study comparing LSC and RSC found that RSC was more expensive and was linked to lengthier operations with more postoperative discomfort. Nonetheless, both surgical procedures yielded comparable outcomes in terms of symptom relief [54].

2. Sacrohysteropexy to preserve the uterus

For patients with apical prolapse, there are three options: sacrohysteropexy, which preserves the uterus by securing the uterus and vagina with a mesh to the sacral promontory; supracervical hysterectomy with sacrocervicocolopopexy, which does not; and sacrocolpopexy following total hysterectomy with closure of the vaginal cuff. By conserving the uterus, hysteropexy provides the benefit of retaining fertility and natural menopausal timing. Assuming equal surgical effectiveness, 36% to 60% of female patients choose for uterine preservation. The uterosacral-cardinal ligaments may also be damaged as a result of the uterus being removed, further weakening the vaginal support. Sacrohysteropexy could be advantageous if uterine preservation is not contraindicated.

Sacrohysteropexy, however, has fewer surgical outcome data available, and The method necessitates ongoing monitoring of the endometrium and cervix.

There are no randomised trials contrasting hysteropexy with simultaneous sacrocolpopexy and hysterectomy. In prospective trials, Costantini et al. [55] compared abdominal sacrohysteropexy to complete hysterectomy and sacrocolpopexy.

In this study, 72 patients with grade 3 to 4 POP self-selected either sacrohysteropexy or complete hysterectomy and sacrocolpopexy as their procedure of choice. Both groups showed comparable, high success rates (100% and 100%, respectively), with no reoperations required owing to recurrence. As compared to the complete hysterectomy and sacrocolpopexy groups, the sacrohysteropexy group saw shorter average operation times (89 vs. 115 minutes) and significant improvements in sexual function. There are benefits to conducting total hysterectomy and sacrocolpopexy, according to a retrospective research that compared laparoscopic sacrohysteropexy (n=65) to total laparoscopic hysterectomy and sacrocolpopexy [56]. (92.3% vs. 100%, p0.001) and the subjective satisfaction rating was much higher.

3. Sacrocolpopexy and a supracervical hysterectomy

The advantages of supracervical hysterectomy may lower the danger of mesh erosion, preventing cautery-induced vaginal thermal damage [61]. Compared to the complete hysterectomy group, which had a mesh exposure incidence of 4.9%, the supracervical hysterectomy group had zero mesh exposures (p=0.03). Unfortunately, there is currently a dearth of proof supporting the effectiveness of supracervical hysterectomy. A small study comparing laparoscopic sacrohysteropexy (n=15) to laparoscopic sacrocolpopexy with concurrent supracervical

hysterectomy revealed that while major complications and vaginal mesh erosions were not recorded, the overall success rate for laparoscopic supracervical hysterectomy with sacrocolpopexy was significantly higher (67% vs. 27%). Retrospective research revealed that compared to complete hysterectomy with sacrocolpopexy, supracervical hysterectomy with sacrocolpopexy was 2.8 times more likely to cause recurring prolapse.

4. Mesh fixation techniques

when recurring prolapse was deemed to be prolapse greater than or equivalent to stage 2 and sacrocolpopexy was performed. With 7.5% in the whole hysterectomy with sacrocolpopexy group vs. 2.3% in the supracervical hysterectomy with sacrocolpopexy group (p=0.35), this research lacked the statistical power to detect differences in mesh exposure rates [61].

5. Non-absorbable sutures versus absorbable sutures

Nonabsorbable suture is used in traditional open sacrocolpopexy to keep the mesh attached to the vagina. www.icurology.org

Ko and Lee used the sacral promontory to reduce the chance of mesh exposure and suture erosion (doi:10.4111/icu.2019.60.6.413). Porcine animals that had synthetic mesh implanted revealed that after 2 weeks, the mesh had attained 74% of its ultimate strength and reached its full strength after 3 months. Delayed absorbable monofilament suture totally absorbed after 6 to 8 months [65], lost 100% of its tensile strength after 2 to 3 months, and 50% of it after 4 weeks [65]. According to the danger of mesh problems, braided non-absorbable suture (2-0 Ethibond; Ethicon, Somerville, NJ, USA) exposure rate was 3.7% (6/161), but no difficulties were reported.

Monofilament delayed-absorbable sutures (2-0 polydioxanone sutures, Ethicon) caused erosions (p=0.002) [66]. The use of absorbable sutures for both vaginal and sacral mesh attachment was successful in a group of RSC patients with a median follow-up of 33 months, and the 3-year survival rate without repeat prolapse surgery was 93%. The benefit of the risk of mesh erosion, however, was not evaluated in this study [67]. It seems doubtful that absorbable sutures represent a risk factor for mesh separation, notwithstanding the absence of supporting data. Further research will be required to discover the ideal suture type to employ in POP repair, as well as the ideal suture position and quantity.

CONCLUSIONS

According on the surgeon's expertise, POP repair is accomplished in various situations utilising somewhat different approaches. It is challenging to come to consistent findings from the literature since study designs and criteria of therapeutic effectiveness vary widely. Yet according to all prior study, the aim of surgery is to increase patient happiness while also repositioning the pelvic organs. Whilst the FDA warning about vaginal mesh has led to a decline in mesh use, it is not an exaggeration to say that the outcome of POP repair is directly connected to the experience of the surgeon. Moreover, minimally invasive surgery has grown in acceptance and is progressively developing to be on par with conventional methods for POP correction.

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