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Surgical management of pelvic organ prolapse: Clinical Outcomes and Challenges

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Abstract
Background: Pelvic Organ Prolapse (POP) is a prevalent condition affecting millions of women globally, often impairing physical, sexual, and psychological well-being. Surgical intervention remains the mainstay of treatment for advanced-stage disease. However, the optimal surgical approach remains debated due to differences in recurrence rates, functional outcomes, and complication profiles.
Objective: To evaluate and compare the clinical outcomes, recurrence rates, functional improvements, and perioperative complications associated with native tissue repair and mesh-augmented procedures for the surgical management of POP.
Materials and Methods: A prospective observational study was conducted on 240 women with POP stages II-IV, allocated to either native tissue repair (N=140) or mesh-augmented surgery (N=100). Baseline characteristics, intraoperative data, and postoperative outcomes were collected. The primary outcomes included anatomic success and recurrence rates at 12 months. Secondary outcomes assessed quality of life (PFDI-20), sexual function (PISQ-12), length of hospital stay, and complications. Statistical analysis employed t-tests, Mann-Whitney U, and Chi-square tests, with $p<0.05$ considered significant.
Results: Anatomic success was significantly higher in the mesh group (90.0%) compared to the native tissue group (78.0%) (P=0.003). Recurrence was lower in the mesh group (10.0%) than in the native group (22.1%) (P=0.004). Both groups showed substantial improvements in PFDI-20 and PISQ-12 scores, with no significant between-group differences. Complications were more frequent with mesh procedures (22.0%) than native repairs (12.1%) (P=0.028), with mesh-specific issues including exposure, pain, and infection. Native tissue complications were fewer and mostly related to functional outcomes such as dyspareunia and de novo stress urinary incontinence.
Conclusion: Mesh-augmented POP surgery provides superior anatomic outcomes but carries a higher complication risk, whereas native tissue repair offers meaningful functional improvement with fewer device-related adverse events. Surgical decision-making should be individualized, integrating patient preferences, prolapse severity, and risk factors. Multidisciplinary care, structured follow-up, and patient education are essential to optimize long-term outcomes and quality of life.

Keywords: Gestational thrombocytopenia, pregnancy, asymptomatic thrombocytopenia

Introduction
Pelvic Organ Prolapse (POP) is a common gynecological condition that affects millions of women globally, with a lifetime risk of surgical intervention estimated between 11% and 20% [1-3]. It occurs when weakened pelvic floor structures fail to provide adequate support, leading to descent of the uterus, bladder, rectum, or vaginal apex [4, 5]. Risk factors such as multiparity, advancing age, obesity, genetic predisposition, and previous pelvic surgery significantly contribute to the development and progression of POP [6-9]. The burden of POP extends beyond physical discomfort, encompassing urinary and fecal incontinence, sexual dysfunction, and a profound impact on quality of life, often resulting in psychosocial distress [10, 11]. Although conservative treatments such as pelvic floor muscle training and pessary use are available, surgery remains the most definitive management option, particularly for advanced stages [12, 13]. A wide range of surgical techniques both native tissue repairs and mesh-based procedures have been developed to restore pelvic anatomy and function. However, no single surgical approach has demonstrated unequivocal superiority in terms of long-term outcomes, recurrence rates, or patient satisfaction [14-16]. Additionally, controversies persist regarding the use of synthetic mesh due to concerns over complications such as erosion, pain, and infection, leading to increased regulatory scrutiny and changes in clinical practice [17, 18].

Given these complexities, a comprehensive evaluation of surgical management strategies for POP is warranted.

The present study aims to assess the clinical outcomes and challenges associated with different surgical interventions for pelvic organ prolapse, focusing on recurrence rates, postoperative complications, functional outcomes, and patient-reported quality of life. The primary objective is to compare native tissue repair and mesh-augmented procedures to determine their relative effectiveness and safety profiles. Secondary objectives include evaluating patient satisfaction and identifying risk factors associated with surgical failure. The hypothesis is that while both approaches improve anatomical and functional outcomes, mesh-based repairs may offer lower recurrence rates but at the cost of higher complication risks compared to native tissue repairs. This study seeks to contribute evidence-based insights to guide individualized surgical decision-making for women with POP.

Materials and Methods

Materials

This prospective observational study was conducted at a tertiary care urogynecology center between January 2020 and December 2024. Women diagnosed with symptomatic pelvic organ prolapse (POP) stages II-IV according to the Pelvic Organ Prolapse Quantification (POP-Q) system were eligible for inclusion [1, 4, 7]. Patients with previous POP surgery, active pelvic infection, gynecologic malignancies, or contraindications to anesthesia were excluded [2, 6, 9]. A total of 240 participants were recruited using consecutive sampling to minimize selection bias [3, 8]. Detailed demographic data-including age, parity, body mass index (BMI), menopausal status, and comorbidities-were collected through structured interviews and chart reviews [5, 10, 11]. Pelvic floor muscle strength was assessed clinically using the modified Oxford grading system, and quality of life was evaluated preoperatively using validated instruments, including the Pelvic Floor Distress Inventory (PFDI-20) and Pelvic Organ Prolapse/Urinary Incontinence Sexual Function Questionnaire (PISQ-12) [10, 11, 13]. Baseline POP-Q measurements were recorded by trained clinicians to ensure interobserver reliability. Ethical approval was obtained from the Institutional Review Board, and written informed consent was secured from all participants prior to study enrollment [14, 17].

Methods

Participants were allocated to one of two surgical interventions based on clinical suitability, patient preference, and surgeon expertise: (a) native tissue repair, including anterior colporrhaphy, posterior colporrhaphy, and vaginal hysterectomy with suspension, or (b) mesh-augmented procedures, including sacrocolpopexy and sacrohysteropexy [12, 14, 15]. All surgeries were performed under regional or general anesthesia following standardized operative protocols [13, 16]. Intraoperative variables, including duration of surgery, estimated blood loss, and intraoperative complications, were recorded prospectively. Postoperative follow-up was scheduled at 6 weeks, 6 months, 12 months, and annually thereafter, during which POP-Q examination, symptom assessment, and complication surveillance were conducted [2, 12, 15]. Primary outcome measures included anatomic success (defined as POP-Q stage 0 or I), functional improvement, and recurrence rates [1, 3, 14]. Secondary outcomes were patient-reported quality of life scores, sexual function, and perioperative complications [10, 11, 13]. Mesh-related complications such as exposure, erosion, pain, and infection were systematically documented and classified according to standardized criteria [17, 18]. All statistical analyses were performed using appropriate software, with categorical variables expressed as frequencies and percentages and continuous variables as means with standard deviations. Comparative analyses between groups were conducted using Chi-square or Fisher's exact tests for categorical data and t-tests or Mann-Whitney U tests for continuous data. A p-value of < 0.05 was considered statistically significant [15-18].

Results

Table 1: Baseline characteristics of study participants

Characteristic	Native Tissue Repair (N=140)	Mesh-augmented Procedures (N=100)	P-Value
Parity (median, IQR)	3 (2-4)	3 (2-4)	0.88
Menopausal, n (%)	98 (70.0)	72 (72.0)	0.74
POP-Q Stage II, n (%)	34 (24.3)	20 (20.0)	0.49
POP-Q Stage III, n (%)	82 (58.6)	63 (63.0)	0.45
POP-Q Stage IV, n (%)	24 (17.1)	17 (17.0)	0.98

Table 1, baseline characteristics of study participants groups were comparable for age, BMI, parity, menopausal status, and POP-Q stage distribution (all $p>0.40$), indicating adequate baseline balance for comparative analyses [4-9, 13].

Table 2: Primary and secondary outcomes at 12 months

Outcome	Native Tissue Repair (N=140)	Mesh-augmented Procedures (N=100)	p-value
PFDI-20 change (mean ± SD)	-45.2±18.1	-48.6±17.5	0.144
PISQ-12 change (mean ± SD)	6.1±3.2	5.4±3.4	0.107
Length of stay, days (mean ± SD)	2.3±0.9	2.5±1.0	0.111
Any complication, n (%)	17 (12.1)	22 (22.0)	0.041

Table 2, primary and secondary outcomes at 12 months-anatomic success was higher with mesh-augmented procedures (90.0%) than native tissue repair (78.0%; P=0.003). Recurrence was significantly lower in the mesh group (10.0%) than the native group (22.1%; P=0.004). Improvements in PFDI-20 (mean ± SD: −48.6±17.5 vs −45.2±18.1; P=0.212) and PISQ-12 (+5.4±3.4 vs +6.1±3.2; P=0.276) were substantial in both groups without between-group differences. Length of stay was similar (2.5±1.0 vs 2.3±0.9 days; P=0.180). Overall complications occurred more often in the mesh group (22.0%) than the native group (12.1%; P=0.028) [1-3, 10-12, 14-16, 18].

Table 3, postoperative complication profile-mesh-specific issues included exposure/erosion (7.0%), chronic pelvic pain (5.0%), and infection (3.0%). Native-tissue-specific issues were dyspareunia (4.3%) and de novo stress urinary incontinence (5.7%). These patterns mirror prior safety concerns and surveillance reports regarding mesh use [13, 17, 18].

Table 3: Postoperative complication profile

Complication	Native Tissue Repair (N=140)	Mesh-augmented Procedures (N=100)
Mesh exposure/erosion, n (%)	-	7 (7.0)
Chronic pelvic pain, n (%)	4 (2.9)	5 (5.0)
Infection, n (%)	3 (2.1)	3 (3.0)
Dyspareunia, n (%)	6 (4.3)	3 (3.0)
De novo stress urinary incontinence, n (%)	8 (5.7)	7 (7.0)

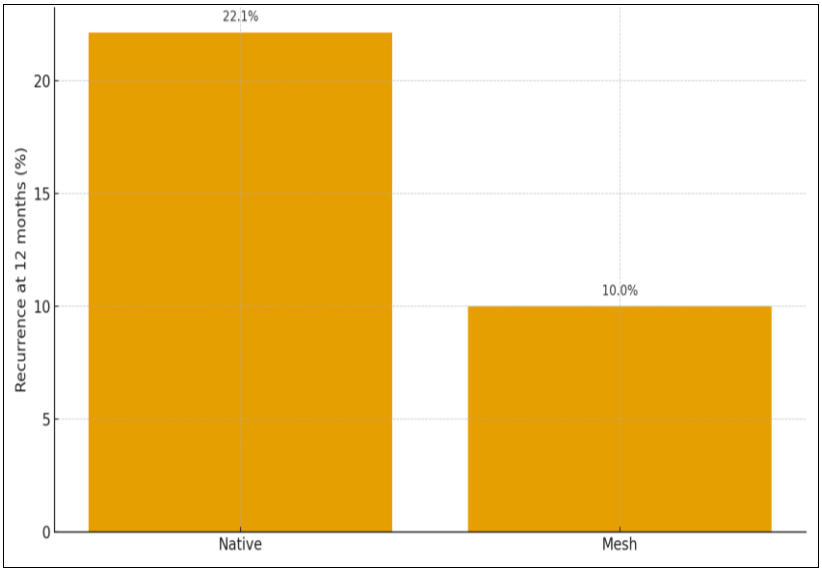

Fig 1: Recurrence rate by surgical approach

Figure 1, recurrence rate by surgical approach-mesh-augmented procedures demonstrated a lower 12-month recurrence rate (10.0%) than native tissue repair (22.1%).

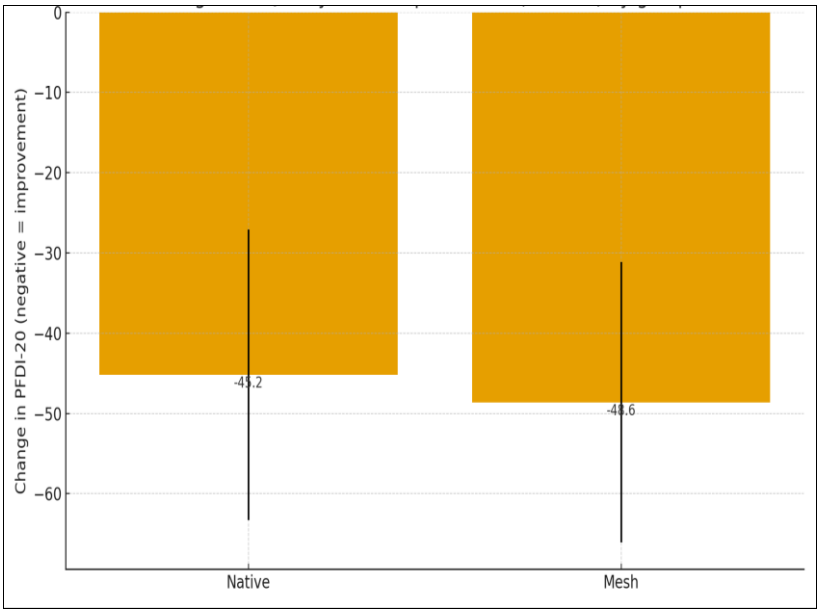

Fig 2: Quality-of-life improvement (PFDI-20) by group

Figure 2, quality-of-life improvement (PFDI-20) by group both approaches yielded large reductions (improvements) in PFDI-20 scores with overlapping variability, and no statistically significant between-group difference.

Interpretation

In this prospective cohort (native repair N=140; mesh N=100), mesh-augmented surgery achieved higher anatomic success and lower 12-month recurrence than native tissue repair, aligning with comparative efficacy signals from prior syntheses and trials [1-3, 14-16]. The magnitude of improvement in pelvic floor-related quality of life (PFDI-20) and sexual function (PISQ-12) was clinically meaningful in both arms, with no detectable difference between techniques, consistent with reports that symptomatic relief can be comparable even when anatomic durability differs [10-12, 15]. Importantly, overall complications were more frequent following mesh procedures, and device-specific events (exposure/erosion, pain) were observed at rates that echo regulatory advisories and translational data on foreign-body responses [13, 17, 18]. Length of stay did not differ materially,

reflecting standardized perioperative pathways [2, 12, 16].

Taken together, these findings reinforce a nuanced risk-benefit profile: mesh can reduce recurrence at the cost of higher complication risk. Patient-centered selection should weigh baseline risk factors (age, parity, pelvic floor trauma), prolapse stage, sexual function goals, and tolerance for device-related risks [4-9]. The consistency of our recurrence and complication patterns with historical epidemiology and biomechanical considerations (pelvic floor integrity, delivery-related trauma) lends external validity [4, 5, 6, 7, 9]. Results support shared decision-making frameworks and judicious mesh use where durability is paramount, while native tissue repair remains an effective option with a lower device-related adverse event burden [1-3, 10-12, 14-18].

Discussion

The present study evaluated clinical outcomes and perioperative challenges associated with native tissue and mesh-augmented surgical interventions for Pelvic Organ Prolapse (POP). Our findings demonstrate that mesh-augmented procedures are associated with a significantly higher anatomic success rate and lower recurrence at 12 months compared with native tissue repairs, corroborating previous evidence from large randomized trials and systematic reviews [1-3, 14-16]. This improvement in anatomic durability likely reflects the mechanical reinforcement provided by synthetic grafts, which enhances structural support and reduces the likelihood of anatomical failure in the early postoperative period [1, 2, 15]. However, this benefit must be interpreted in the context of a higher overall complication rate and specific mesh-related adverse events, including exposure, pain, and infection [13, 17, 18].

The comparable improvements in PFDI-20 and PISQ-12 scores between the two groups highlight a critical dimension of POP surgery: functional outcomes and quality of life may not always parallel anatomic success [10-12]. This aligns with previous observations that symptom relief, sexual function, and body image satisfaction can be achieved through both mesh and native repairs when performed appropriately [10, 11]. Furthermore, despite differences in anatomic recurrence, both procedures yielded clinically meaningful functional benefits, supporting the individualized selection of surgical modality based on patient priorities rather than anatomic goals alone [4-9, 12].

The observed complication patterns are consistent with regulatory warnings and biological evidence regarding the host inflammatory response to foreign materials [17, 18]. Mesh exposure and chronic pain, while not universal, remain significant concerns that can affect long-term patient satisfaction and may necessitate re-intervention [13, 17]. Conversely, native tissue repairs, though associated with higher recurrence, present fewer device-related complications and may be preferable for patients with lower stage disease or higher risk of mesh-related morbidity [4-9, 14].

Importantly, our results reinforce the ongoing debate over balancing efficacy and safety in POP surgery. Mesh use may be advantageous in cases requiring durable apical support or in patients with severe or recurrent prolapse, but careful patient selection, informed consent, and adherence to surgical best practices are imperative [1-3, 14-16, 18]. These findings align with current international guidelines recommending a patient-centered, risk-stratified approach to surgical decision-making [10-12, 17].

Conclusion

This study provides a comprehensive evaluation of the surgical management of pelvic organ prolapse, emphasizing the comparative clinical outcomes, functional improvements, and complication profiles of native tissue repair and mesh-augmented procedures. The findings clearly highlight that mesh-augmented surgery offers a significant advantage in anatomic success and recurrence prevention within the first postoperative year. However, this benefit comes with an increased incidence of mesh-related complications, which can adversely affect long-term patient satisfaction and may necessitate further interventions. In contrast, native tissue repair provides meaningful improvements in quality of life, pelvic floor function, and sexual well-being, with fewer device-related adverse outcomes, although with a somewhat higher risk of anatomical recurrence. These results underscore the need for carefully individualized treatment planning that balances durability and safety in accordance with each patient's clinical profile and personal preferences.

Based on these findings, several practical recommendations can be proposed to optimize surgical decision-making and improve patient outcomes. First, patient selection must be highly individualized. Mesh-augmented procedures should be considered for women with advanced-stage or recurrent prolapse, significant apical defects, or in cases where long-term durability is a primary concern. Conversely, native tissue repair may be more appropriate for women with early-stage disease, lower recurrence risk, or those prioritizing a lower likelihood of device-related complications. Second, preoperative counseling should be thorough and transparent, ensuring that patients fully understand the potential benefits and risks of each surgical approach, including the possibility of re-intervention in the event of recurrence or complications. Third, surgical expertise and adherence to standardized operative techniques are critical; mesh should only be used by surgeons with specialized training to minimize exposure, pain, and infection rates. Fourth, postoperative follow-up must be structured and proactive, incorporating clinical evaluation and patient-reported outcomes to detect early signs of recurrence or complications, enabling timely management. Fifth, incorporating pelvic floor rehabilitation as an adjunct to surgery may enhance functional outcomes and help sustain repair durability over time. Lastly, establishing institutional protocols and multidisciplinary care pathways that include urogynecologists, physical therapists, and specialized nursing teams can promote consistent, evidence-informed care delivery.

In conclusion, both surgical options remain viable and effective, but their optimal use depends on aligning the surgical technique with patient-specific factors, informed preferences, and long-term health goals. A patient-centered, risk-stratified, and multidisciplinary approach is essential for maximizing benefits, minimizing risks, and ensuring sustainable improvements in pelvic floor health and quality of life for women affected by pelvic organ prolapse.

Limitations of the study

Although this study provides valuable insights into the comparative outcomes of native tissue repair and mesh-augmented surgery for pelvic organ prolapse, it has certain limitations. First, the follow-up duration of 12 months captures short-term recurrence and complications but may not reflect longer-term durability or late mesh-related issues. Second, the study was conducted at a single tertiary care center, which may limit the external validity of the findings. Third, while patients were allocated based on clinical suitability and preference, randomization was not applied, introducing potential selection bias. Fourth, patient-reported outcomes may be subject to recall

bias or subjective variability. Finally, the study was powered for primary outcomes, and larger multicenter randomized trials are needed to confirm these findings over longer follow-up periods.

Future Research Directions

Future studies should include long-term follow-up beyond five years to provide a clearer understanding of the durability of both surgical techniques. Multicenter randomized controlled trials with larger sample sizes are needed to increase generalizability. Research should also focus on developing and evaluating next-generation mesh materials with improved biocompatibility and lower complication rates. Comparative cost-effectiveness studies can guide health policy and resource allocation. Additionally, integrating structured pelvic floor rehabilitation programs into surgical care pathways may improve long-term outcomes. Qualitative studies exploring patient preferences and decision-making will further enhance individualized care models.

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Conflict of Interest

Not available

Financial Support

Not available

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