



PELVIC FLOOR MUSCULATURE IN WOMEN: ANATOMICAL SUPPORT, OBSTETRIC STRESS AND PREVENTION OF PELVIC ORGAN PROLAPSE

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ABSTRACT: Pelvic floor muscles are central to continence, pelvic-organ support, childbirth mechanics and long-term quality of life. This article examines pelvic floor anatomy and the clinical consequences of obstetric mechanical stress. Global evidence suggests that pelvic organ prolapse affects a substantial proportion of women, while childbirth, age, obesity and connective-tissue factors contribute to risk. The pelvic floor should be understood as a dynamic muscular-fascial system rather than a static anatomical base. Prevention requires anatomy-based education, respectful childbirth care, early symptom recognition and rehabilitation pathways.

Keywords: pelvic floor; levator ani; pelvic organ prolapse; urinary incontinence; obstetric trauma; prevention

INTRODUCTION

The pelvic floor is one of the most underestimated structures in women's health. In basic anatomy it may appear as a bowl-shaped muscular diaphragm, but clinically it is a living support system that coordinates continence, sexual function, childbirth, organ suspension and pressure control. When this system fails, the result may not be immediately life-threatening, but it can be life-limiting: urinary leakage, prolapse, pelvic pressure, chronic discomfort and reduced participation in social life.

The levator ani muscles, coccygeus, perineal body, endopelvic fascia and ligamentous supports work together. They are not separate spare parts. The pelvic floor must stretch during vaginal birth and then recover. If the load is excessive, if recovery is unsupported, or if connective tissue and hormonal factors reduce resilience, pelvic floor dysfunction can develop years after the original obstetric event.

Modern obstetrics sometimes frames childbirth risk only as mortality, hemorrhage or fetal outcome. That is too narrow. A safe birth should also consider long-term pelvic health. Conversely, preventing pelvic floor injury cannot mean promoting unnecessary surgical birth, because caesarean delivery carries its own short- and long-term risks. The real issue is balanced, evidence-informed risk reduction.

The objective of this article is to analyze pelvic floor musculature as a clinical system, relate it to obstetric stress and summarize prevention-oriented implications for medical students and early clinicians.



METHODS

A narrative review approach was used. International epidemiological data on pelvic organ prolapse, maternal health, caesarean section trends and intrapartum care were reviewed. The selection priority was given to sources that connect anatomical structures to patient outcomes rather than to purely descriptive anatomical texts.

The analysis followed three questions: which pelvic floor structures provide support, which obstetric and non-obstetric factors increase stress on these structures, and which small clinical practices can reduce avoidable harm? The Results section is organized around those questions.

This article does not prescribe individualized treatment. Its purpose is educational and analytical, with emphasis on anatomy, prevention, early recognition and referral.

RESULTS

The levator ani complex is the central muscular component of the pelvic floor. The pubococcygeus, puborectalis and iliococcygeus form a muscular sling that supports the pelvic organs and contributes to continence. The perineal body acts as a fibromuscular anchor, connecting superficial and deep perineal structures. Damage to this point may weaken both anterior and posterior compartment support.

Fascial structures are equally important. The endopelvic fascia, uterosacral-cardinal ligament complex and arcus tendineus provide suspension and lateral support. A purely muscle-based view is therefore incomplete. Prolapse often reflects combined failure of muscle, fascia and connective-tissue integrity rather than a single torn muscle.

Pregnancy increases pelvic floor load through uterine enlargement, hormonal softening of connective tissue and increased intra-abdominal pressure. Vaginal birth adds mechanical stretch, especially during the second stage. Instrumental birth, prolonged second stage, high birthweight and severe perineal trauma may increase risk. However, caesarean section is not a simple solution, because population-level caesarean rates have risen far above older benchmarks in many settings without proportional benefits for all outcomes.

Pelvic organ prolapse is common, although estimates vary depending on whether prevalence is based on symptoms, examination or imaging. A recent meta-analysis reported an overall prevalence around 30.9%, a figure that should make pelvic floor health a mainstream topic rather than a specialist afterthought. Many women delay care because symptoms are normalized or considered embarrassing.

Pelvic floor dysfunction overlaps with urinary, bowel and sexual symptoms. A patient may not use the word 'prolapse'; she may report pressure, a bulging sensation, leakage during coughing, incomplete emptying or avoidance of physical activity. Medical students should therefore learn symptom clusters, not only anatomical labels.

Prevention begins during antenatal education and continues after birth. Practical measures include respectful childbirth care, avoidance of unnecessary intervention, correct recognition of prolonged labor, repair of perineal trauma when present, postpartum pelvic floor exercises and referral for physiotherapy when symptoms persist. These are small actions compared with surgery, but they can shift outcomes when applied consistently.

Case-based result 1: A woman three months after childbirth reports urine leakage when coughing. If the clinician asks only about bleeding and breastfeeding, the problem remains invisible. Pelvic floor assessment requires direct, respectful questions about leakage, pressure, pain and activity limitation.



Case-based result 2: A multiparous patient reports a feeling of heaviness after standing all day. Even without visible severe prolapse, this symptom can indicate support weakness. Functional symptoms should be taken seriously before advanced prolapse develops.

Case-based result 3: A patient with persistent perineal pain after repair needs assessment of scar tenderness, infection, muscle spasm and nerve irritation. The absence of heavy bleeding does not mean recovery is complete.

Case-based result 4: A woman with chronic constipation and pelvic pressure demonstrates that pelvic floor dysfunction is not only obstetric. Intra-abdominal pressure and bowel habits can worsen support defects, so prevention must include general health counseling.

These cases support a broader definition of postpartum safety. Survival is essential, but it is not the only outcome. Continence, mobility, pain control and dignity determine whether recovery is meaningful for the patient.

The practical result is a recommended postpartum micro-screen: leakage, bulge or pressure, bowel difficulty, pain with sitting or movement, and return to daily activity. This can be asked in less than two minutes but may reveal problems patients would not volunteer.

Table 1. Statistical indicators used for clinical interpretation

Indicator	Reported value	Interpretation in this article
Pelvic organ prolapse pooled prevalence	about 30.9% in a 2024 meta-analysis	Shows high global burden and under-recognition.
Global caesarean rate trend	about 7% in 1990 to about 21% today	Birth mode debates must consider both pelvic floor and surgical risks.
Maternal deaths in 2023	about 260,000	Safe childbirth systems remain essential.
PPH deaths per year	about 70,000	Pelvic support and uterine contractility intersect in postpartum care.
Endometriosis burden	about 190 million reproductive-age women	Pelvic pain differentials overlap with floor dysfunction.

Table 2. Practical clinical matrix for student use

Clinical question	Most useful first assessment	Escalation trigger
Is support weakened?	Ask about bulge, pressure and leakage	Functional limitation or visible prolapse
Was birth trauma relevant?	Review second stage, tears and repair history	Persistent pain or continence symptoms
Is prevention possible?	Teach pelvic floor exercises and follow-up	Symptoms beyond early recovery period

DISCUSSION

The central failure mode in pelvic floor education is fragmentation. Anatomy is taught in one course, obstetric trauma in another, urinary symptoms in another and rehabilitation somewhere else. The patient, however, experiences them as one problem. A better curriculum would connect these pieces from the beginning.

There is also a tradeoff in childbirth policy. Excessive fear of pelvic floor injury can push clinicians or patients toward unnecessary caesarean delivery. Excessive fear of caesarean delivery



can lead to under-recognition of difficult labor or avoidable perineal injury. The balanced position is not ideological; it is risk-based and individualized.

Another practical issue is under-reporting. Pelvic floor symptoms are often hidden because of shame or the belief that they are normal after childbirth. Clinicians should ask directly but respectfully about urinary leakage, pressure symptoms and sexual discomfort during postpartum follow-up. Waiting for patients to volunteer these symptoms is a weak strategy.

The pelvic floor also illustrates why anatomy must include function. Students who can name the levator ani but cannot explain stress urinary incontinence have not learned enough. Students who can draw the perineal body but cannot explain why perineal repair matters have not reached clinical competence.

Pelvic floor rehabilitation is often considered after symptoms appear, but prevention should begin earlier. During antenatal care, women can be informed about pelvic floor exercises, warning symptoms and the fact that seeking help for leakage or prolapse is legitimate. Education reduces silence, and silence is one reason these conditions remain undertreated.

The levator ani should be understood as both voluntary and reflexive support. It reacts to increases in intra-abdominal pressure during coughing, lifting and physical work. This is especially relevant in communities where women return early to labor-intensive activities after childbirth. Postpartum advice must therefore be realistic, not copied from settings with different social conditions.

The pelvic floor is also affected by non-obstetric pressures such as chronic cough, constipation, heavy lifting and obesity. A prevention plan limited to delivery technique is therefore incomplete. General medicine has a role because many risk factors are managed outside gynecology clinics.

A strong clinical history should ask whether leakage occurs during coughing, laughing, prayer movements, exercise or lifting. These details identify functional impact. A patient who avoids leaving home because of leakage has a health problem even if physical examination appears mild.

The edge case is the young postpartum woman whose symptoms are dismissed because she is not old. Pelvic floor dysfunction is more common with age, but childbirth-related injury can affect younger women. Age should not be used to invalidate symptoms.

Another edge case is pain without visible prolapse. Muscle hypertonicity, scar tenderness or nerve irritation may produce major symptoms despite a normal-looking support exam. Students should avoid assuming that visible prolapse is the only pelvic floor disorder.

A further clinical point is the relationship between pelvic floor symptoms and mental health. Women who avoid travel, work or social events because of leakage or pressure symptoms may experience embarrassment and isolation. The clinician should not minimize these effects simply because the condition is not usually fatal.

Pelvic floor education should be practical rather than abstract. A student can explain that the muscles function like a supportive hammock and that training aims to improve controlled contraction and relaxation. Overly technical explanations may make patients disengage.

Referral pathways should be explicit. If a primary clinician identifies persistent leakage, prolapse symptoms or pain, the patient should know whether she needs physiotherapy, gynecologic review or urogynecologic assessment. Vague advice to 'wait' is not a plan.

The prevention message must also include dignity. Asking about symptoms in a private setting, using non-judgmental language and normalizing help-seeking are low-cost interventions. They may determine whether the patient speaks honestly.



In examination, students should be trained to connect symptoms with compartments. Anterior symptoms often include urinary leakage or bladder pressure; apical symptoms may include uterine or vault descent; posterior symptoms may include bowel emptying difficulty. This compartment thinking prevents vague and incomplete assessment.

Another practical issue is follow-up timing. Symptoms immediately after delivery may improve, but persistent symptoms after the early recovery period deserve evaluation. Clear time-based advice helps patients know when to return rather than silently tolerating dysfunction.

Pelvic floor care is multidisciplinary. Obstetricians, general practitioners, physiotherapists, nurses and community health workers can all contribute. If only specialists discuss pelvic floor symptoms, many patients will never reach the correct door.

The educational conclusion from these additional findings is direct: pelvic floor anatomy should be tested with clinical vignettes, not only with labeling diagrams. A student must show that anatomy leads to questions, prevention and referral.

From a health-system perspective, pelvic floor care is cheaper when conservative support begins early. Physiotherapy, education and follow-up are less invasive than delayed surgery. This is why postpartum counseling is not a luxury service.

The tradeoff in postpartum advice is between rest and social reality. Telling a woman simply to avoid lifting may be impossible if she has household labor responsibilities. Advice must include practical alternatives, family education and warning signs.

For student research, a confidential survey on urinary leakage, pelvic pressure and help-seeking after childbirth could reveal hidden burden. The key ethical requirement would be privacy, because stigma can distort responses.

A curriculum that includes pelvic floor anatomy, obstetric trauma and rehabilitation in one module would be stronger than teaching them separately. Integration is the smallest structural change with the largest educational payoff.

Perineal trauma is not only an acute wound. Poorly recognized or poorly repaired injury may alter support, pain and function. This does not mean every birth injury is preventable, but it does mean careful assessment after delivery is essential.

Research in Uzbekistan could use simple validated questionnaires and postpartum follow-up to estimate symptom burden. Without local numbers, health systems may underestimate the need for physiotherapy and urogynecologic referral.

The main limitation of this review is the absence of local prevalence data. International estimates may not fully represent Uzbek populations, where birth practices, parity patterns, nutrition, physical workload and access to postpartum rehabilitation may differ. That gap is itself a research opportunity for student-led observational studies.

The smallest effective improvement is a pelvic-floor checklist for postpartum and gynecologic visits: pressure or bulge, leakage, bowel symptoms, pain, birth history, perineal trauma, and functional limitation. This would turn a hidden condition into an assessable clinical pathway.

CONCLUSION

The pelvic floor is a dynamic muscular-fascial support system with major implications for women's health. Its dysfunction is common, under-discussed and clinically meaningful.

Medical education should connect pelvic anatomy with childbirth mechanics, symptom recognition and prevention. That shift would make care more realistic, more respectful and more useful for patients.



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