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EDITORIAL

Pelvic floor dysfunction in patients with gestational diabetes mellitus

Mustafa Arslan, Ramazan Kozan

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Mustafa Arslan, Department of Anestesiology and Reanimation, Gazi University Faculty of Medicine, Ankara 06560, Yenimahalle, Türkiye

Ramazan Kozan, Department of General Surgery, Gazi University Faculty of Medicine, Ankara 06500, Yenimahalle, Türkiye

Co-first authors: Mustafa Arslan and Ramazan Kozan.

Corresponding author: Mustafa Arslan, MD, Professor, Department of Anestesiology and Reanimation, Gazi University Faculty of Medicine, Emniyet Mh. Mevlana Blv. No. 47, Ankara 06560, Yenimahalle, Türkiye. mustarslan@gmail.com

Abstract

In this editorial, we comment on an article by Wang *et al*. Recent literature shows an increase in research on pelvic organ prolapse (POP). Although the true incidence of POP remains uncertain, its impact on quality of life is substantial. Anatomical studies report high incidence rates, surpassing those observed in symptom-based surveys. Weakness of the endopelvic fascia is a primary anatomical risk factor for POP. Additionally, gestational diabetes mellitus (GDM) has emerged as a growing concern, as poor glycemic control increases complications for both mother and fetus. GDM and POP are interconnected, with factors like maternal obesity, macrosomia, and hormonal changes exacerbating pelvic floor dysfunction. Modifiable risk factors, such as obesity and chronic hyperglycemia, along with multiparity, instrumental deliveries, and obstetric trauma, further increase susceptibility. For patients with GDM, gynecological exams, Pelvic Organ Prolapse Quantification staging, and pelvic floor ultrasonography are valuable diagnostics, with proctological exams and magnetic resonance defecography aiding in multi-compartment prolapse diagnoses. Imaging, though uncomfortable during pregnancy, is safe in the early postpartum period. This editorial emphasizes the need for further research on the pathophysiology of GDM-related POP and offers recommendations for improving diagnosis and clinical management of patients with GDM.

Key Words: Defecography; Chronic hyperglycemia; Gestational diabetes mellitus; Multiparity; Pelvic floor ultrasonography; Pelvic organ prolapse; Obesity

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Core Tip: Recent years have seen a surge in pelvic organ prolapse (POP) research, highlighting significant links between gestational diabetes mellitus (GDM) and increased POP risk due to factors such as obesity and macrosomia. Diagnostic tools, including Pelvic Organ Prolapse Quantification staging and pelvic floor ultrasonography, are crucial in assessing POP, especially in patients with GDM. Understanding these relationships and utilizing appropriate diagnostic methods can aid in the early identification and effective management of POP, particularly during the postpartum period.

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INTRODUCTION

Both age and parity are key contributors to the increased risk of developing pelvic organ prolapse (POP) over time[1]. Recent literature reflects a surge in POP research, especially over the last two decades, though uncertainty about its true incidence persists. POP, which greatly affects quality of life, is reported at high rates in anatomical studies (around 50%), exceeding those of symptom-based surveys[2,3]. In clinical practice, the frequency of asymptomatic POP cases, particularly during gynecological or proctological examinations, cannot be ignored. Weakness of the endopelvic fascia is identified as the primary anatomical factor for POP[1,4]. However, it is clear that the pathophysiology is much more complex. Previous studies have focused heavily on anatomical factors, but metabolic and endocrine disruptions, especially in populations with GDM, have been largely understudied.

Similar to POP, gestational diabetes mellitus (GDM) has become a growing concern for women in recent years[1,5]. Poor glycemic control during pregnancy is known to increase the risk of complications for both the mother and the fetus. The abnormal increase in maternal and fetal weight inevitably leads to an increased load on the pelvic floor and intra-abdominal pressure. Moreover, it is suggested that other pathways related to GDM may also contribute to the increased frequency of POP in this group. Despite the growing prevalence of both conditions, the interaction between GDM and POP has not been thoroughly explored in the literature, leaving a gap in understanding the extent of shared pathophysiological mechanisms. Investigating the relationship between these two prevalent issues will help identify candidate groups for postpartum POP monitoring and/or treatment by analyzing their synergistic relationships.

PATHOPHYSIOLOGY AND PREDISPOSING FACTORS

For POP, nonmodifiable risk factors include race, gender, and genetic makeup[4]. However, there are modifiable or triggering risk factors. Obesity is one such factor, contributing to pelvic floor dysfunction by causing chronic increases in intra-abdominal pressure, nerve damage, and associated conditions[6,7]. Increased intra-abdominal pressure causes excessive tension in pelvic structures, including the pudendal nerve. While pregnancy itself is a risk factor for POP due to increased intra-abdominal pressure, maternal obesity and macrosomia associated with GDM exacerbate this effect[8]. Additionally, long-term hyperglycemia has been reported to cause collagen loss and muscle weakness in the pelvic floor muscles[9]. It is interesting to note that women with GDM experience varying degrees of weakness in the pelvic floor and rectus abdominis muscles during pregnancy, along with a reduction in the amount of type I/II collagen in both fast and slow muscle fibers[10]. Hyperglycemia can impair collagen synthesis in the body, reducing the elasticity of pelvic floor tissues and connective tissues. Collagen plays a critical role in the strength and elasticity of connective tissue. Weakened connective tissue can lead to the descent of pelvic organs and an increased risk of prolapse. These effects of hyperglycemia are further compounded by hormonal changes during pregnancy, such as elevated progesterone and decreased collagen levels, which may disrupt pelvic muscle integrity[11].

Pregnancy induces physiological alterations, including increased pressure on the pelvic floor due to the growing uterus and fetal weight. These factors, combined with pregnancy-related hormonal changes, such as elevated progesterone, increased relaxin, and reduced collagen levels, contribute to weakened pelvic floor muscle strength and diminished support and sphincteric function[9]. During pregnancy, particularly in the second and third trimesters, elevated levels of progesterone and relaxin contribute to increased elasticity in connective tissue. These hormones facilitate the relaxation of connective tissue to widen the birth canal and ease delivery. However, this relaxation can also lead to weakening of the pelvic floor connective tissue and a reduction in the functionality of its supportive mechanisms. Progesterone and relaxin can also directly affect the pelvic floor muscles, as these hormones induce muscle relaxation. This process increases susceptibility to the displacement of anatomically normal pelvic organs during pregnancy, thereby increasing the risk of postpartum POP. The relaxant effects of increased progesterone and relaxin levels on the pelvic floor are further accentuated in women with GDM[4,5,10].

Neuropathic effects represent a significant pathophysiological mechanism in the development of POP, particularly in individuals with prolonged hyperglycemia, such as those with GDM. Chronic hyperglycemia can lead to diabetic neuropathy, which involves damage to the peripheral nerves due to prolonged elevated blood sugar levels. This damage results in altered nerve conduction and a reduction in the ability of the pelvic floor muscles to respond to stimuli[1,5,10].

The pelvic floor muscles, which are essential for supporting the pelvic organs and maintaining continence, rely on proper nerve signaling for coordination and strength. Diabetic neuropathy affects both the sensory and motor nerves that innervate the pelvic floor. Sensory nerve impairment leads to decreased proprioception, making it more difficult for the body to sense and correct changes in pelvic organ position. Motor nerve damage, on the other hand, impairs the contraction and coordination of the pelvic floor muscles, leading to muscle weakness and a reduced ability to provide structural support.

One of the most significant risk factors for POP is multiparity. Women with one child have a fourfold increased likelihood of seeking hospital care for POP compared to women who have never given birth, while women with two children have an 8.4 times greater likelihood[12]. Interestingly, the number of births increases the risk of initial POP but is not a risk factor for recurrent POP[13]. Instrumental deliveries, especially forceps-assisted deliveries, have been reported to increase the risk of POP[14]. Naturally, a history of obstetric trauma is also an unavoidable risk factor. In patients with GDM, the risk of difficult delivery and birth-related trauma may be even more prominent.

DIAGNOSIS AND EVALUATION

In patients with GDM, the diagnosis of POP can be informed by clinical findings, gynecological examination, Pelvic Organ Prolapse Quantification (POP-Q) staging, and pelvic floor ultrasonography. However, the use of these methods during pregnancy or the early postpartum period may present challenges, including patient discomfort and altered anatomy due to ongoing physiological changes. A significant positive correlation exists between the POP-Q stage and both the minimal levator hiatus area and levator ani deficiency scores, which can be assessed using 3D pelvic floor ultrasound[15]. For patients with an obstructive defecation syndrome component, proctological examination and magnetic resonance defecography are particularly valuable for diagnosing and staging multi-compartment prolapses[16,17]. Dynamic imaging of pelvic floor anatomy also proves valuable in diagnosing dyssynergic defecation[18]. Clinicians should consider timing these evaluations to avoid unnecessary patient discomfort during late pregnancy, potentially prioritizing assessments in the early postpartum period. While this examination may be uncomfortable during pregnancy due to the imaging techniques involved, it is generally considered safe to perform in the early postpartum period for patients diagnosed with POP.

CONCLUSION

The rising prevalence of POP and its association with GDM underscores the need for comprehensive management strategies. The interplay of obesity, macrosomia, and hormonal changes during pregnancy has a substantial impact on pelvic floor health. Accurate diagnosis through POP-Q staging, pelvic floor ultrasonography, and additional imaging techniques is essential for effective treatment. To optimize management, early postpartum evaluations are recommended, particularly for women with GDM who may present with additional risk factors, such as obesity or multiparity. Implementing targeted postpartum screening programs for high-risk populations could significantly reduce the long-term complications associated with POP. Early identification, especially in postpartum women with GDM, can improve outcomes and enable more effective management of POP.

FOOTNOTES

Author contributions: Arslan M and Kozan R contributed equally to this paper as co-first authors; Arslan M designed the overall concept and outline of the manuscript; Kozan R contributed to the discussion and design of the manuscript; Arslan M and Kozan R contributed to the writing, and editing the manuscript and review of literature; all authors have read and approved the final manuscript.

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Country of origin: Türkiye

ORCID number: Mustafa Arslan 0000-0003-4882-5063; Ramazan Kozan 0000-0002-3835-8759.

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