Heterogeneity of adenomyosis in different population

Selntigia A [1,2], Russo C [1], Monaco G [1], Nocita E [1], Valeriani S [1], Exacoustos C [1]

[1] Department of Surgical Sciences, Obstetrics and Gynecological Unit, University of Rome "Tor Vergata", Italy; [2] IVIRMA Global Research Alliance, IVIRMA Roma, Italy

Objectives

Adenomyosis is increasingly recognized as a potential cause of infertility, yet its precise impact on reproductive outcomes remains unclear. This study investigated the correlation of adenomyosis localization and infertility, highlighting its effects on endometrial receptivity, implantation failure, and pregnancy outcomes. Understanding this correlation may improve diagnostic and therapeutic approaches in reproductive medicine. The main aim of this study was to evaluate the association of the precise localization of adenomyosis (internal myometrium and/or external myometrium) and the reproductive outcomes in different populations composed of infertile patients, Recurrent Pregnancy Loss (RPL) and patients with at least one Live Birth (LB).

Methods

This retrospective observational study, included infertile patients admitted to Gynecological Ultrasound Unit of the University of Rome "Tor Vergata", Italy, between June 2018 and February 2025. All patients underwent 2D, 3D and Power-Doppler (PD) Trans Vaginal Sonography (TVS) examination in order to evaluate accurately the presence and the localization of adenomyosis (internal and/or external myometrium). The diagnosis of adenomyosis was performed with the presence of at least two direct signs based on current Morphological Uterus Sonographic Assessment (MUSA) classification. The ultrasonographic diagnosis was performed before the pregnancy (LB group), before the miscarriage (RPL group) and before the IVF treatment (infertile group). All patients with adenomyosis and infertility performed in-vitro fertilization after at least 12 months of regular, unprotected sexual intercourse were included.

Results

Among 383 patients with infertility and adenomyosis, 223 were infertile, 80 experienced RPL and 80 achieved at least one live birth (LB). Among these groups the different position of adenomyosis was investigated dividing in only inner myometrial, only external and mixed. A statistically higher presence of only inner myometrium, diffuse, moderate and severe adenomyosis was described in the group with infertility compared to LB group ($p= 0.0486$; $p<0.0001$; $p= 0.0282$; $p= 0.0016$, respectively). The presence of only adenomyosis was significantly higher in the patients with RPL compared to infertile ones ($p<0.0001$), while the presence of endometriosis, specifically DIE ($p<0.0001$), diffuse ($p<0.0001$), moderate ($p=0.0005$) and severe ($p=0.0016$) adenomyosis were significantly higher in the infertile population compared to RPL (Table 1 and 2).

Conclusions

Adenomyosis is linked to poor reproductive outcomes through mechanisms that remain incompletely understood. Our study demonstrated a strong association of the presence of adenomyosis in the RPL and infertile group compared to LB group. In particular, the inner myometrial involvement was strongly presented in the infertility group.

Population characteristics	Infertility 223	RPL 80	*p* value
Mean age at diagnosis	39.7 ± 6.1	36.5 ± 5.6	
BMI	20.45 ± 5.2	23.28 ± 4.5	
Only adenomyosis	92 (41.3%)	56 (70%)	< 0.0001
Adenomyosis+endometriosis	131 (58.7%)	24 (30%)	< 0.0001
Endometriosis	131 (58.7%)	24 (30%)	< 0.0001
- DIE	121 (54.3%)	18 (22.5%)	< 0.0001
- endometriomas	10 (4.5%)	6 (7.5%)	NS
Adenomyosis			
- only inner myometrium	44 (19.7%)	22 (27.5%)	NS
- only outer myometrium	111 (49.8%)	32 (40%)	NS
- mix	63 (28.3%)	26 (32.5%)	NS
- focal	51 (22.9%)	24 (30%)	NS
- diffuse	171 (76.7%)	30 (37.5%)	< 0.0001
- mild	90 (40.4%)	62 (77.5)	< 0.0001
- moderate	80 (35.9%)	12 (15%)	0.0005
- severe	53 (23.8%)	6 (7.5%)	0.0016

Table 1. *Description of the different localization of adenomyosis in the group with infertility compared to RPL (Recurrent Pregnancy Loss). **BMI**: Body Mass Index; **DIE**: Deep Infiltrated Endometriosis.*

Population characteristics	Infertility 223	LB 80	*p* value
Mean age at diagnosis	39.7 ± 6.1	35.0 ± 6.3	
BMI	20.45 ± 5.2	21.45 ± 5.2	
Only adenomyosis	92 (41.3%)	18 (22.5%)	0.0028
Adenomyosis+endometriosis	131 (58.7%)	62 (77.5%)	0.0028
Endometriosis	131 (58.7%)	62 (77.5%)	0.0028
- DIE	121 (54.3%)	46 (57.5%)	NS
- endometriomas	10 (4.5%)	4 (5%)	NS
Adenomyosis			
- only inner myometrium	44 (19.7%)	8 (10%)	0.0486
- only outer myometrium	111 (49.8%)	52 (65%)	0.0195
- mix	63 (28.3%)	20 (25%)	NS
- focal	51 (22.9%)	20 (25%)	NS
- diffuse	171 (76.7%)	40 (50%)	< 0.0001
- mild	90 (40.4%)	56 (70%)	< 0.0001
- moderate	80 (35.9%)	18 (22.5%)	0.0282
- severe	53 (23.8%)	6 (7.5%)	0.0016

Table 2. *Description of the different localization of adenomyosis in the group with infertility compared to LB (Live Birth). **BMI**: Body Mass Index; **DIE**: Deep Infiltrated Endometriosis.*