

Hypothesis

Bladder endometriosis is present in approximately 1% of women with endometriosis, and it is defined as the presence of endometrial tissue in the detrusor muscle. When an endometriotic nodule is observed by transvaginal ultrasound (TVUS) in the anterior compartment (anterior cul-de-sac and/or bladder detrusor), a cystoscopy is usually performed to confirmed the aetiology of the nodule and to estimate the distance between the ureteral orifices and the nodule borders.

Our **hypothesis** is that TVUS could describe the degree of infiltration of endometriotic nodules in the anterior compartment, and therefore, predict the results of the cystoscopy. Moreover, patients with more infiltrative nodules (affecting completely the bladder detrusor or the mucosa) present more symptoms and more severe disease than women with less infiltrative nodules (affecting anterior cul-de-sac or partially the bladder detrusor).

The **aim** of the study is to compare the results of the TVUS and cystoscopy in women with endometriosis in the anterior compartment. Additionally, patients with less infiltrative nodules (Group 1) will be compare with those women with infiltrative nodules (Group 2).

Methods and Materials

A prospective study was designed, including patients with endometriosis in the anterior compartment who consecutively attended an Endometriosis Unit of a university tertiary referral centre, from January 2016 to December 2018.

The diagnosis of the endometriosis in the anterior compartment were performed by **TVUS**, describing the infiltration of the nodule (anterior cul-de-sac, detrusor partially, detrusor totally with bladder protrusion, detrusor and mucosa) and its size. Both ureteral meatus were tried to be identified and the rest of focus of pelvic endometriosis were also collected. The presence of hydronephrosis were evaluated by abdominal ultrasound. Demographic and epidemiological variables, symptoms and previous surgeries were obtained: parity, infertility, haematuria and intensity of symptoms (dysmenorrhea, dyspareunia, dysuria, pelvic pain, dyschezia) using the Visual Analog Pain Scale (VAS) from 0 to 10.

A **cystoscopy** was performed in all patients by expert urologists, classifying the procedure in 3 categories: normal, endometriotic nodule affecting detrusor, endometriosis nodule affecting mucosa.

Concordance between TVUS and cystoscopy were analysed, considering that less infiltrative nodules (cul-de-sac or partial detrusor) in TVUS would obtain a normal cystoscopy; while more infiltrative nodules (total detrusor and mucosa) would be observed by cystoscopy.

In addition, the presence of symptoms and other types of endometriosis (posterior compartment nodules, endometriomas and adenomyosis) were analysed comparing women with less infiltrative nodules (Group 1) or more infiltrative nodules (Group 2).

Results

From 2016 to 2018, the two sonographers of the Endometriosis Unit performed TVUS to a total of 2207 women. Endometriosis in the anterior compartment was identified in 22 patients (**1%** of women), who were included in the study. The mean age was $35,8\pm 6.7$ years old, only 2 were multiparas, 7 were infertile and 14 referred previous surgeries for endometriosis.

The description of the **22 nodules** in the anterior compartment is described in Table 1. **Total concordance was observed between TVUS and cystoscopy**, although one of the nodule described as mucosa infiltrative by TVUS was described as normal mucosa by cystoscopy (5% discordance). Ureteral meatus were visualized up to 20/22 women by TVUS, while were identified and not obstructed by the endometriotic nodules in 21/22 women (5% discordance). Considering symptoms, mean dysuria was higher in Group 2 ($p=0.0004$). No statistically significant differences were found between groups in the rest of symptoms (globally, mean dysmenorrhea $7,60\pm 2.4$, dyschezia $3,05\pm 3.7$, pelvic pain $2,15\pm 3.2$ and dyspareunia $3,95\pm 3.9$). Finally, only 4 women had signs of hydronephrosis in the abdominal ultrasound, all of them due to retrocervical nodules affecting ureters. Nodules in the anterior compartment did not cause hydronephrosis in any case.

Table 1. Description of the 22 endometriotic nodules in the anterior compartment.

	GROUP 1 (Less infiltrative bladder nodules) N=9	GROUP 2 (Infiltrative bladder nodules) N=13	TOTAL N=22
INFILTRATION			
Anterior cul-de-sac	5		
Partial detrusor	4		
Total detrusor		5	
Bladder mucosa		8	
CYSTOSCOPY			
Normal	9	0	9
Abnormal	0	13	13*
SIZE (mm, mean and SD)	20.4±9.8	26.4±7.8	23.95±8.96**
SYMPTOMS			
Dysuria (VAS, mean and SD)	1±2.7	5.7±3.5***	
Haematuria	1	3	4

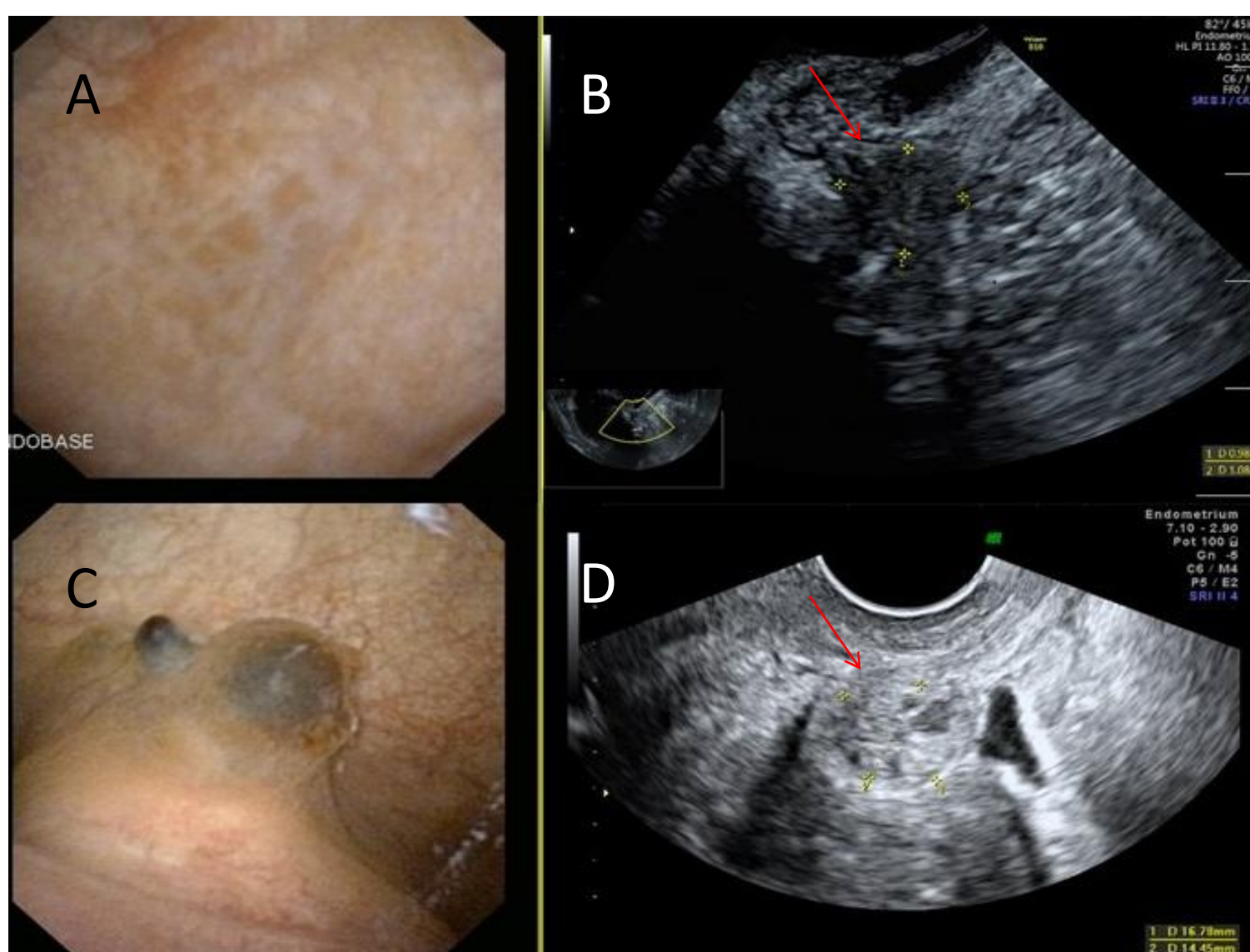


Figure 1. Image of the anterior nodule affecting partially the detrusor by cystoscopy (A) and TVUS (B); and an infiltrative nodule by cystoscopy © and TVUS (D).

Interpretation of results

The infiltration of endometriotic nodules in the anterior compartment could be identified by TVUS, predicting the findings of the cystoscopy with high precision. Nodules that partially affect the detrusor and do not protrude into the bladder cavity present normal cystoscopies, which should be avoided.

Women with more infiltrative nodules referred more dysuria than women with nodules that not protrude in the bladder cavity. Bladder nodules do not usually affect ureteral meatus and do not frequently cause hydronephrosis.

Conclusions

TVUS can identified the infiltration of the endometriotic nodules in the anterior compartment and the involvement of the ureteral meatus, with high accuracy in comparison with cystoscopy.