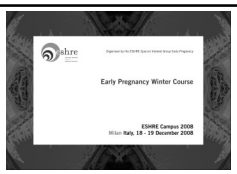


TVS in diagnosing adenomyosis

Francesco P.G. Leone
Department Obstetrics & Gynecology
Chief Prof. Irene Cetin
Clinical Sciences Institute Luigi Sacco
University of Milan

Università degli Studi di Milano

TVS in diagnosing adenomyosis

- ***Background***
- ***Pathology***
- ***2D-Transvaginal sonography***
- ***3D-Transvaginal sonography***
- ***Summary***

leone.francesco@hsacco.it

Background

- *Adenomyosis is most commonly diagnosed in multiparous women with a peak age of 40–50 years.*
- *Adenomyosis is a disease of the archimetrium (inner myometrium, endometrial-subendometrial unit, uterine junctional zone), which appears hypoechogenic at TVS (subendometrial halo).*

leone.francesco@hsacco.it

Background

- *Clinically, patients may present with uterine enlargement, menorrhagia, dysmenorrhea, and/or pelvic pain with symptom severity correlating with both the extent and depth of myometrial invasion.*

- *Adenomyosis is reported with a frequency of 20–35% in women undergoing hysterectomy for benign disorders.*

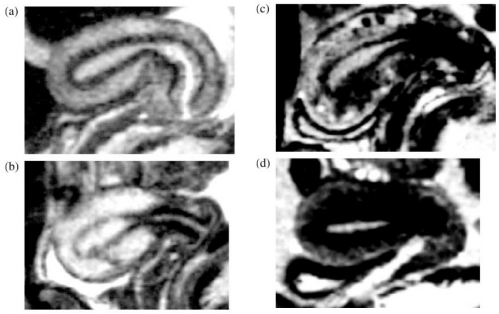
leone.francesco@hsacco.it

Human Reproduction Vol.20, No.8 pp. 2309–2316, 2005
doi:10.1093/humrep/deh523
Advance Access publication June 2, 2005

Adenomyosis in endometriosis—prevalence and impact on fertility. Evidence from magnetic resonance imaging

G.Kunz[1,4], D.Beil[2], P.Huppert[1], M.Noe[1,3], S.Kissler[3] and G.Leyendecker[1,5]

Figure 1. Sagittal MRI scans are shown. (a) Normal uterus, (b) minor focal adenomyosis in the anterior uterine wall, (c) larger focal adenomyosis in the anterior uterine wall, (**d**) diffuse adenomyosis of the whole uterine corpus with a preponderance in the posterior wall.



leone.francesco@hsacco.it

Human Reproduction Vol.20, No.8 pp. 2309–2316, 2005
doi:10.1093/humrep/deh523
Advance Access publication June 2, 2005

Adenomyosis in endometriosis—prevalence and impact on fertility. Evidence from magnetic resonance imaging

G.Kunz[1,4], D.Beil[2], P.Huppert[1], M.Noe[1,3], S.Kissler[3] and G.Leyendecker[1,5]

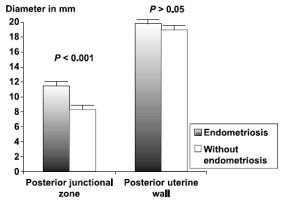


Figure 2. Histogram of the data of all patients with ($n = 160$) and without endometriosis ($n = 67$). The comparison of the diameter of the posterior junctional zone and the posterior uterine wall, respectively, in women with and without endometriosis shows that adenomyosis is primarily an infiltrative process (mean ± SEM).

CONCLUSIONS: With a prevalence of up to 90%, uterine adenomyosis is significantly associated with pelvic endometriosis and constitutes an important factor of sterility in endometriosis presumably by impairing uterine sperm transport.

leone.francesco@hsacco.it

TVS in diagnosing adenomyosis

Background

Pathology

2D-Transvaginal sonography

3D-Transvaginal sonography

Summary

leone.francesco@hsacco.it

Macroscopic and histological aspects

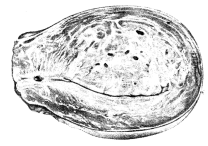
- *Adenomyosis is defined by the intramyometrial presence of endometrial mucosa (glands and stroma) surrounded by reactive, hypertrophic myometrium.*

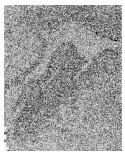
- *Unlike leiomyoma, adenomyosis -either focal or diffuse- has indistinct, poorly delimited margins from the adjacent myometrium.*

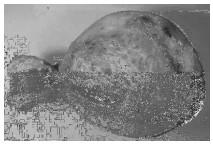
leone.francesco@hsacco.it

Macroscopic and histological aspects

diffuse adenomyosis focal







leone.francesco@hsacco.it

Macroscopic and histological aspects

- *An adenomyoma (focal adenomyosis) is a circumscribed, nodular aggregate of smooth muscle, endometrial glands, and (usually) endometrial stroma.*
- *It may be located within the myometrium or it may involve or originate in the endometrium and grow as a polyp.*
- *A rare variant of an adenomyomatous polyp, the atypical polypoid adenomyoma, has atypical, hyperplastic glands.*

leone.francesco@hsacco.it

TVS in diagnosing adenomyosis

Background

Pathology

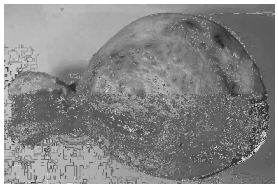
2D-Transvaginal sonography

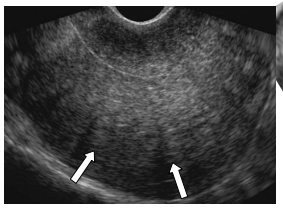
3D-Transvaginal sonography

Summary

leone.francesco@hsacco.it

Sonographic aspects





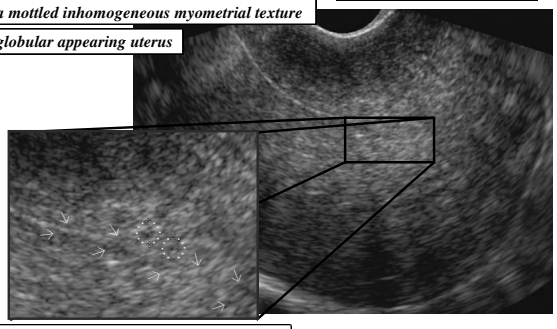
leone.francesco@hsacco.it

Bromley B. et al., J Ultrasound Med 2000

… diffuse adenomyosis

a mottled inhomogeneous myometrial texture

globular appearing uterus

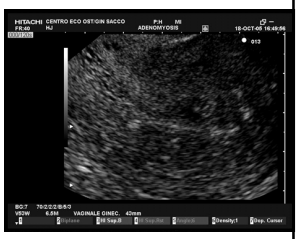


small cystic spaces within the myometrium

a "shaggy" indistinct endometrial stripe

Sonographic aspects

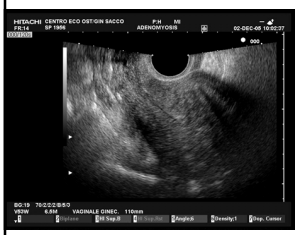
Diffuse superficial adenomyosis

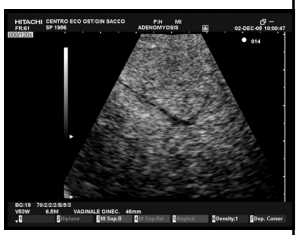


leone.francesco@hsacco.it

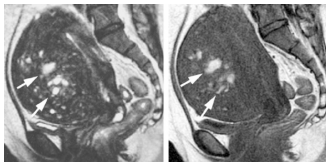
Sonographic aspects

Diffuse deep adenomyosis



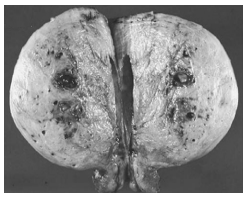


leone.francesco@hsacco.it



Sonographic aspects

Diffuse adenomyosis



leone.francesco@hsacco.it

Ultrasound Obstet Gynecol 2001; 17: 177–178

Picture of the month

Adenomyosis: power Doppler findings

N. PERROT, I. FREY, J.-L. MERGUI, M. BAZOT, M. UZAN and S. UZAN

*Obstetric and Gynecology Department, Hôpital Tenon and Jean Verdier, *Radiology Department, Hôpital Tenon, Paris, France*

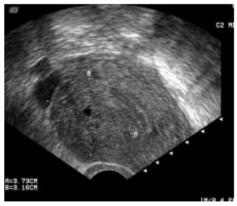


Figure 1 Diffuse widening of the posterior myometrial wall with morphologic appearance typical of adenoymosis.

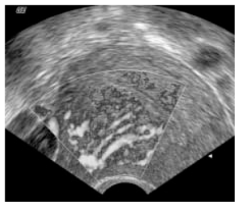
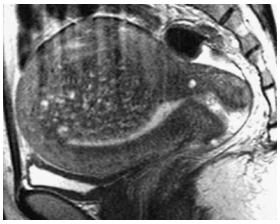


Figure 2 Normal vascular architecture on power Doppler which is diagnostic for adenomyosis and which rules out the diagnosis of myoma.

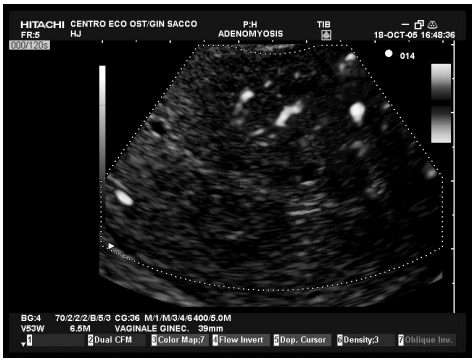
leone.francesco@hsacco.it

Sonographic aspects

Diffuse deep adenomyosis



leone.francesco@hsacco.it



leone.francesco@hsacco.it

Sonographic aspects

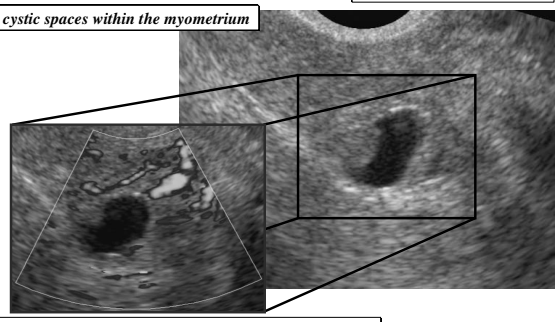
	Adenomyosis	Intramural myoma
Echopattern	inhomogenous	mixed
Shadowing	absent	present
Shape	indistinct	round/ ellipsoidal
Hypoechoic lacunae	present/absent	absent
Margins	indistinct	distinct
Power Doppler	irregular	peripheral
Endometrial echo	indistinct/distinct	distinct/dislocated

leone.francesco@hsacco.it

Reinhold C. et al., Radiology 1995

… focal adenomyosis

cystic spaces within the myometrium

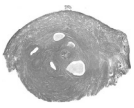


persistent, irregular, slightly dilated radial uterine vessels

Perrot N. et al., UOG 2001

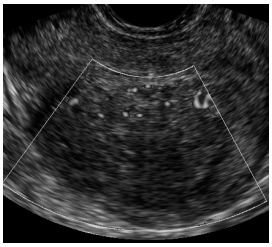
increased microvessel density in adenomyosis uteri

Schindl M.et al., Fertil Steril 2001



Sonographic aspects

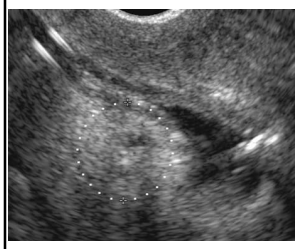
Adenomyoma

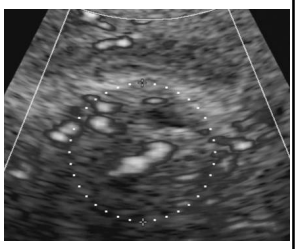


Intramural myoma

leone.francesco@hsacco.it

Sonographic aspects





submucous adenomyoma

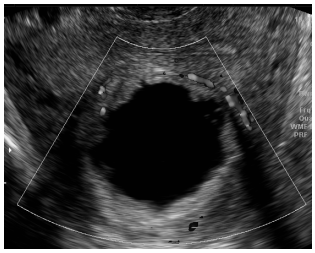
mostly isolated, inhomogenous lesion, with smooth surface, ***indistinct margin***, ***lacunae*** (hypoechoic), and irregular intralesional vascularization

Lee EJ et al., J Ultrasound Med. 2004

leone.francesco@hsacco.it

Sonographic aspects

Cystic adenomyoma



leone.francesco@hsacco.it

Sonographic aspects

	Adenomyoma	Intramural myoma
Echopattern	inhomogenous/cystic	mixed
Shadowing	absent	present
Shape	round	round/ellipsoidal
Hypoechoic lacunae	present/absent	absent
Margins	indistinct	distinct
Power Doppler	irregular	peripheral
Endometrial echo	distinct/dislocated	distinct/dislocated

leone.francesco@hsacco.it

Ultrasound Obstet Gynecol 2007; **30**: 341–345
Published online 23 July 2007 in Wiley InterScience (www.interscience.wiley.com). **DOI:** 10.1002/uog.3985

Transvaginal sonography in the diagnosis of adenomyosis: which findings are most accurate?

K. KEPKEP, Y. A. TUNCAY, G. GÖYNÜMER and E. TUTAL
Health Ministry Göztepe Educational and Research Hospital, Clinic of Obstetrics and Gynecology, Istanbul, Turkey

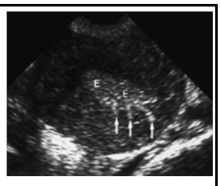


Figure 1 Transvaginal ultrasound image (transverse plane) showing the echogenic linear striations (arrows) from the endometrium (E) to the dorsal myometrium that indicate ectopic endometrial tissue. Reproduced with kind permission[10].

Table 4 Sensitivity, specificity and positive and negative predictive values (PPV and NPV) of transvaginal ultrasound for the diagnosis of adenomyosis from previous series compared with our series

Reference	n	*Sensitivity (%)*	*Specificity (%)*	*PPV (%)*	*NPV (%)*
Siedler *et al.*[17]	80	63	97	71	—
Fedele *et al.*[7]	43	80	74	73	81
Ascher *et al.*[8]	17	52.9	66.6	90	20
Reinhold *et al.*[9]	100	86	86	71	94
Brosens *et al.*[18]	34	86.6	57.9	61.9	84.6
Atzori *et al.*[21]	175	86.6	96.2	68.4	98
Reinhold *et al.*[10]	119	89	89	71	96
Vercellini *et al.*[13]	102	82.7	67	50	90.7
Atri *et al.*[14]	102	81	71	54	90
Bazot *et al.*[2]	120	65	97.5	92.8	88.8
*Bazot *et al.*[12]	23/106	80.9/38.4	100/97.5	100/83.3	40/82.9
This study	70	80.8	61.4	55.3	84.4

leone.francesco@hsacco.it

Best Practice & Research Clinical Obstetrics and Gynaecology
Vol. 20, No. 3, pp. 483–500, 2006
doi:10.1016/j.bpobgyn.2006.01.005
available online at http://www.sciencedirect.com

10

Transvaginal ultrasound for diagnosis of adenomyosis: a review

Margit Dueholm* MD
Department of Gynecology and Obstetrics, Aarhus University Hospital, DK-8000 Aarhus, Denmark

70. Dueholm M, Lundorf E, Hansen ES, Ledertoug S, Sørensen JS & Olesen F. Magnetic Resonance Imaging And Transvaginal Ultrasonography For Diagnosis Of Adenomyosis. *Fertil Steril* 2001; **76**(3): 588–594.
71. Bazot M, Cortez A, Darai E, Rouger J, Chopier J, Antoine JM et al. Ultrasonography Compared With Magnetic Resonance Imaging For The Diagnosis Of Adenomyosis: Correlation With Histopathology. *Hum Reprod* 2001; **16**(11): 2427–2433.

Table 2. Studies of di… tic resonance imaging (MRI) for diagnosis of adenomyosis in consecutive, unselected patients for surgery.

	Reinhold et al[50] % (95%CI)	…azot et al[71] (95%CI)	Dueholm et al[70] % (95%CI)	Total % (95%CI)
TVS:				
Sensitivity	89 (71–97)	…48–79)	68 (44–86)	74 (63–82)
Specificity	89 (80–94)	…90–100)	65 (50–77)	87 (81–91)
Positive predictive value	71 (54–85)	…75–99)	42 (25–61)	68 (58–77)
Negative predictive value	96 (89–99)	…75–91)	85 (69–94)	89 (84–92)
MRI:				
Sensitivity	86 (66–95)	…61–88)	70 (46–87)	78 (68–86)
Specificity	…84–			…(83–92)
Positive pr…	…57–			…(60–79)
Negative pre…	…80–95			…92 (87–95)

leone.francesco@hsacco.it

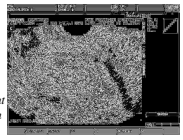
P06.07 ***Conservative management of deep adenomyosis treated with a levonorgestrel-releasing intrauterine system: a sonographic based triage.***

F.P.G. Leone, C. Lanzani, T. Bignardi.
Dept Obst & Gyn, DSC L. Sacco, University of Milan, Italy.

Objective: To evaluate the efficacy of a conservative sonographic based management of deep adenomyosis treated with a levonorgestrel-releasing intrauterine system (LNG-IUS).

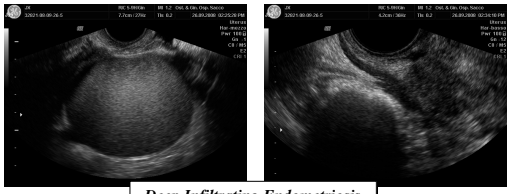
Methods: Sixteen patients were recruited at a second level sonographic office for abnormal uterine bleeding and/or for menometrorrhagia and/or severe anemia with dysmenorrea and/or dyspareunia. All patients underwent transvaginal sonography (TVS) with power-Doppler evaluation and sonohysterography (SHG) (Technos MPX, Esaote, Italy). Deep adenomyosis was diagnosed in presence of an enlarged uterus, with inhomogeneous and thickened myometrium and/or with focal honeycomb lesions highly and irregularly vascularized at TVS. SHG was performed with a 4.7mm intrauterine catheter. At the end of SHG, an endometrial sampling (SHGes) was performed by a syringe vacuum aspiration for a pathologic report. A LNG-IUS was then inserted with an immediate sonographic control. A sonographic follow-up at 3, 6, 12 and every 6 months was proposed.

Results: Mean age (+-sd) was 42 years +-7. Twelve patients presented diffuse adenomyosis and four focal lesions. Simple endometrial hyperplasia at SHGes was diagnosed in three patients (19%). Concerning LNG-IUS, one patient removed the device for persisting pelvic pain and in three cases a continous oral contraceptive therapy was prescribed for persisting spotting. At a median follow-up of 15 months (interquartile range 12-24), no patient needed surgery.

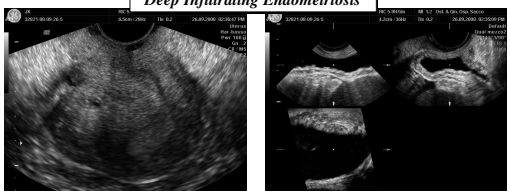


Conclusion: *A conservative sonographic based triage for the management of deep adenomyosis with a levonorgestrel-releasing intrauterine system (LNG-IUS) treatment proved to be efficacious. This triage should be proposed to selected patients within a variety of medical options and before surgical treatments.*

leone.francesco@hsacco.it



Deep Infiltrating Endometriosis



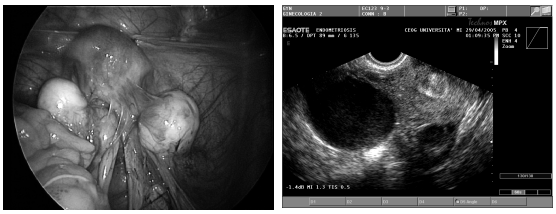
leone.francesco@hsacco.it

"Kissing ovaries": a sonographic sign of moderate to severe endometriosis

Fabio Ghezzi, M.D.,[a] Luigi Raio, M.D.,[b] Antonella Cromi, M.D.,[a] Daniela Günter Duwe, M.D.,[b] Paolo Beretta, M.D.,[a] Marco Buttarelli, M.D.,[a] and Michael D. Mueller, M.D.[b]

[a]Department of Obstetrics and Gynecology, University of Insubria, Del Ponte Hospital, Varese, Italy; and [b]Endometriosis Center, Department of Obstetrics and Gynecology, University of Berne, Berne, Switzerland

Fertility and Sterility® Vol. 83, No. 1, January 2005



leone.francesco@hsacco.it

TVS in diagnosing adenomyosis

- ***Background***
- ***Pathology***
- ***2D-Transvaginal sonography***
- ***3D-Transvaginal sonography***
- ***Summary***

leone.francesco@hsacco.it

Three-dimensional Ultrasonography in Gynecology

Technical Aspects and Clinical Applications

George Bega, MD, Anna S. Lev-Toaff, MD, Patrick O'Kane, MD, Eduardo Becker, Jr, MD, Alfred B. Kurtz, MD

J Ultrasound Med 22:1249–1269, 2003

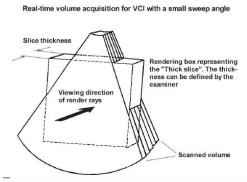
coronal plane

leone.francesco@hsacco.it

New technologies

Multiplanar display
Rendering mode
Volume Contrast Imaging
Tomographic Ultrasound Imaging
VOCAL

leone.francesco@hsacco.it



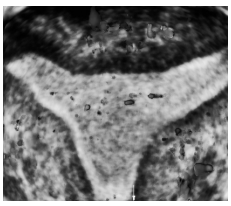
Volume Contrast Imaging (VCI)

B-Mode optimization by contrast enhancement and speckle suppression in the 2D-US image

leone.francesco@hsacco.it

Slice thickness
(2-3mm)

Volume Contrast Imaging (VCI)



leone.francesco@hsacco.it

17th World Congress on Ultrasound in Obstetrics and Gynecology

7-11 October 2007, Florence, Italy

Objective

To evaluate the ***accuracy*** of 3D-transvaginal sonography (***3D-TVS***) by ***VCI analysis*** in the diagnosis of deep uterine adenomyosis in symptomatic pre-menopausal women.

leone.francesco@hsacco.it

Uterine adenomyosis @ 3DTVS-VCI

Methods

- ***24*** consecutive pre-menopausal patients with abnormal uterine bleeding, inhomogeneous and/or thickened myometrium @ 2D-TVS, and the diagnosis of ***deep uterine adenomyosis*** @ 3D-TVS were prospectively enrolled.
- ***3D-TVS*** with GE Voluson 730 using
  a wide-band ***3-9 MHz*** transducer
  CRI & SRI to optimize image before volume acquisition
  VCI analysis by 2mm slices.
- ***Surgery*** (***#17***) and/or ***MRI*** (***#7***) were considered the gold standard.

leone.francesco@hsacco.it

Uterine adenomyosis @ 3DTVS-VCI

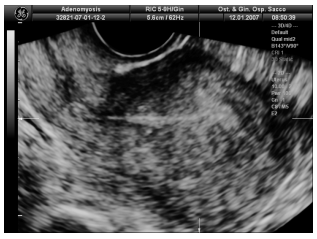
Methods

focal adenomyosis

leone.francesco@hsacco.it

Uterine adenomyosis @ 3DTVS-VCI

Methods



diffuse adenomyosis

leone.francesco@hsacco.it

Uterine adenomyosis @ 3DTVS-VCI

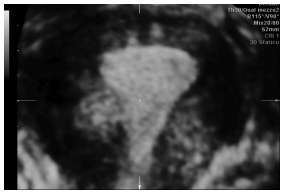
Results

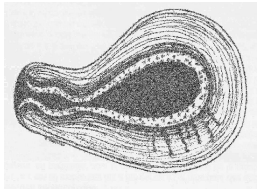
3D-TVS	MRI / Surgery		
	Anterior	**Posterior**	**Diffuse**
Anterior	**6**		
Posterior		**5**	
Diffuse			**13**

leone.francesco@hsacco.it

Sonographic aspects

Diffuse superficial adenomyosis





leone.francesco@hsacco.it

TVS in diagnosing adenomyosis

Background

Pathology

2D-Transvaginal sonography

3D-Transvaginal sonography

Summary

leone.francesco@hsacco.it

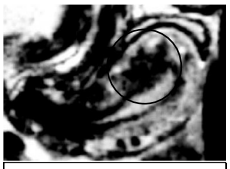
Best Practice & Research Clinical Obstetrics and Gynaecology
Vol. 22, No. 4, pp. 681 – 706, 2006
doi:10.1016/j.bpobgyn.2006.04.004
available online at http://www.sciencedirect.com

4

Imaging in gynecology

Lil Valentin[a] MD, PhD
Professor
Department of Clinical Sciences Malmö, Lund University, Sweden

The diagnostic performance of ultrasound and MRI with regard to adenomyosis is probably similar.



MR imaging

Harmonic TVS imaging

17th World Congress on Ultrasound in Obstetrics and Gynecology

7-11 October 2007, Florence, Italy

Conclusion

- These preliminary results, if confirmed in a ***larger study***, could define ***3D-TVS-VCI*** a ***possible standard*** for the diagnosis of ***deep uterine adenomyosis***.

Department Obstetrics & Gynecology
Clinical Sciences Institute Luigi Sacco
University of Milan

Via G.B. Grassi 74
20157 Milano
Tel (+39) 02.3564576
Fax (+39) 02.50319806

leone.francesco@hsacco.it