



# İnfertil hastalarda ultrasonografiyi nasıl kullanalım ?

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Üreme Sağlığı ve Tüp Bebek Merkezi

# İnfertilite



- Yaklaşık % 15- 20



## Tanısal araç yelpazesi

- **TVUSG -2D -3D -4D**
- Saline infüzyon sonohisterosalpingografi
- Kontrastlı ultrasonografi
- HSG
- Histeroskopi
- Laparoskopi



# Etiketleme, Planlar, Konumlama, Terimler

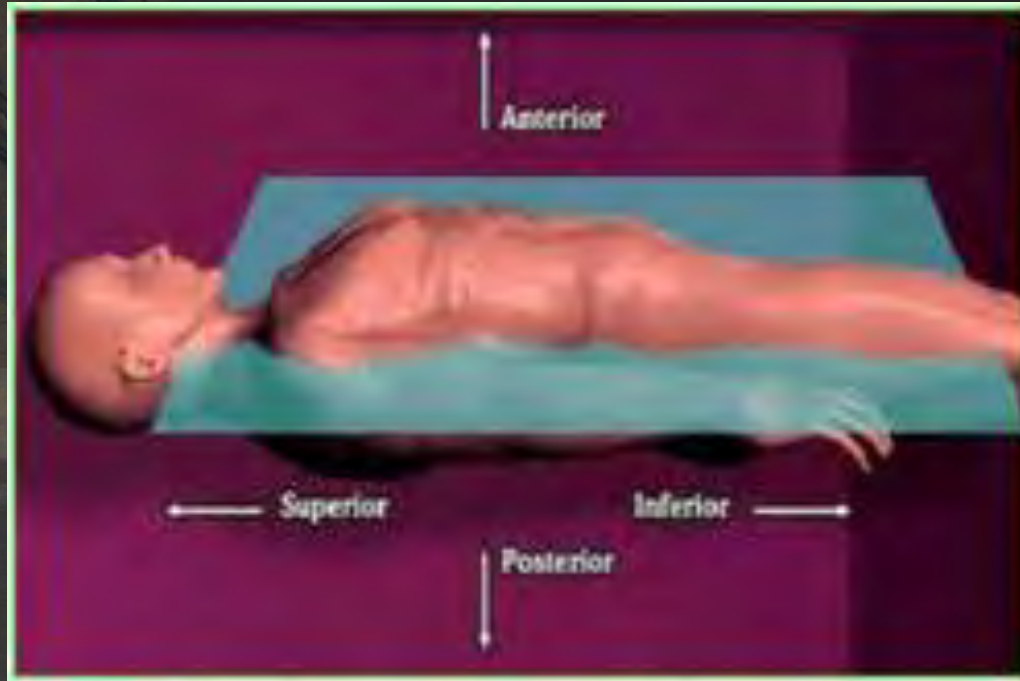




## Konumlama ile ilgili terimler

**Proksimal** :Kökene yakın

**Anterior veya Ventral** : Hastanın ön yüzeyine yakın bulunan yapı



**Inferior veya Kaudal** : Hastanın ayağına yakın konumlanmadaki yapı

**Süperior , Kranial ,Sefalad** : Hastanın başına yakın konumlanmadaki yapı

**Distal** : Kökene uzak

**Posterior veya Dorsal**: Hastanın sırtına yakın bulunan yapı

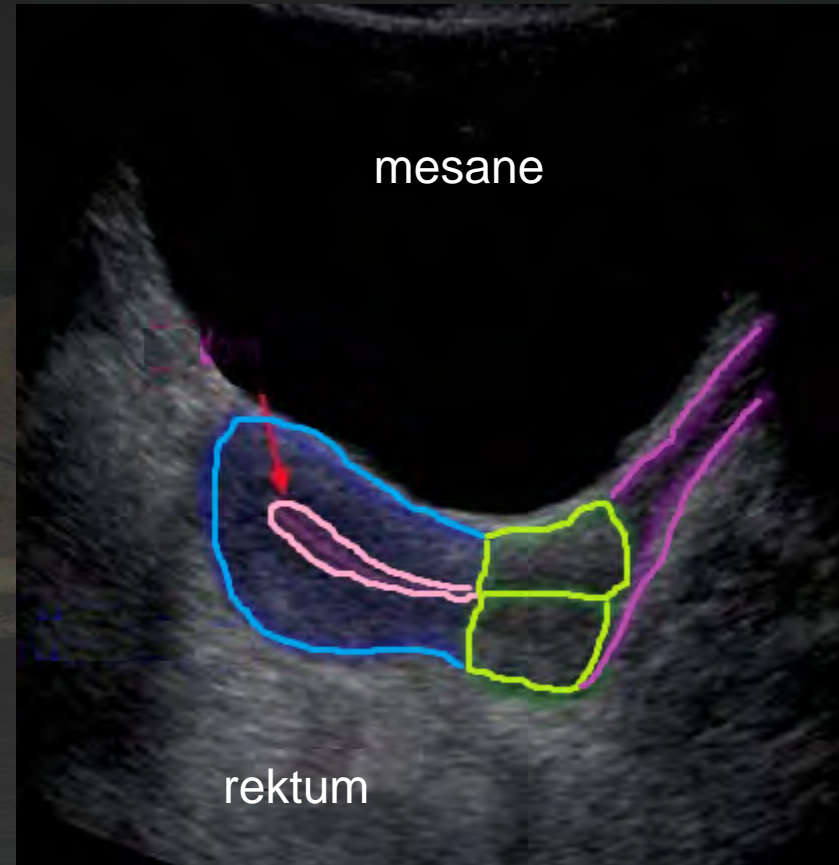


# Longitudinal tarama (Sagittal Tarama)





# Longitudinal tarama (Sagittal Tarama)



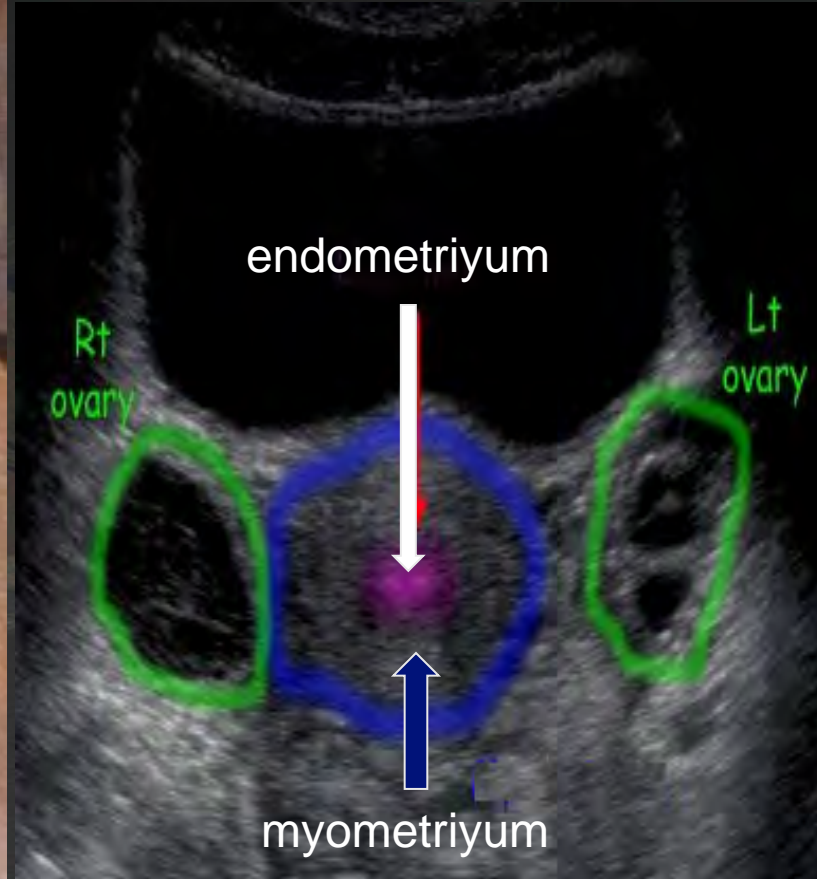
# Transverse Tarama





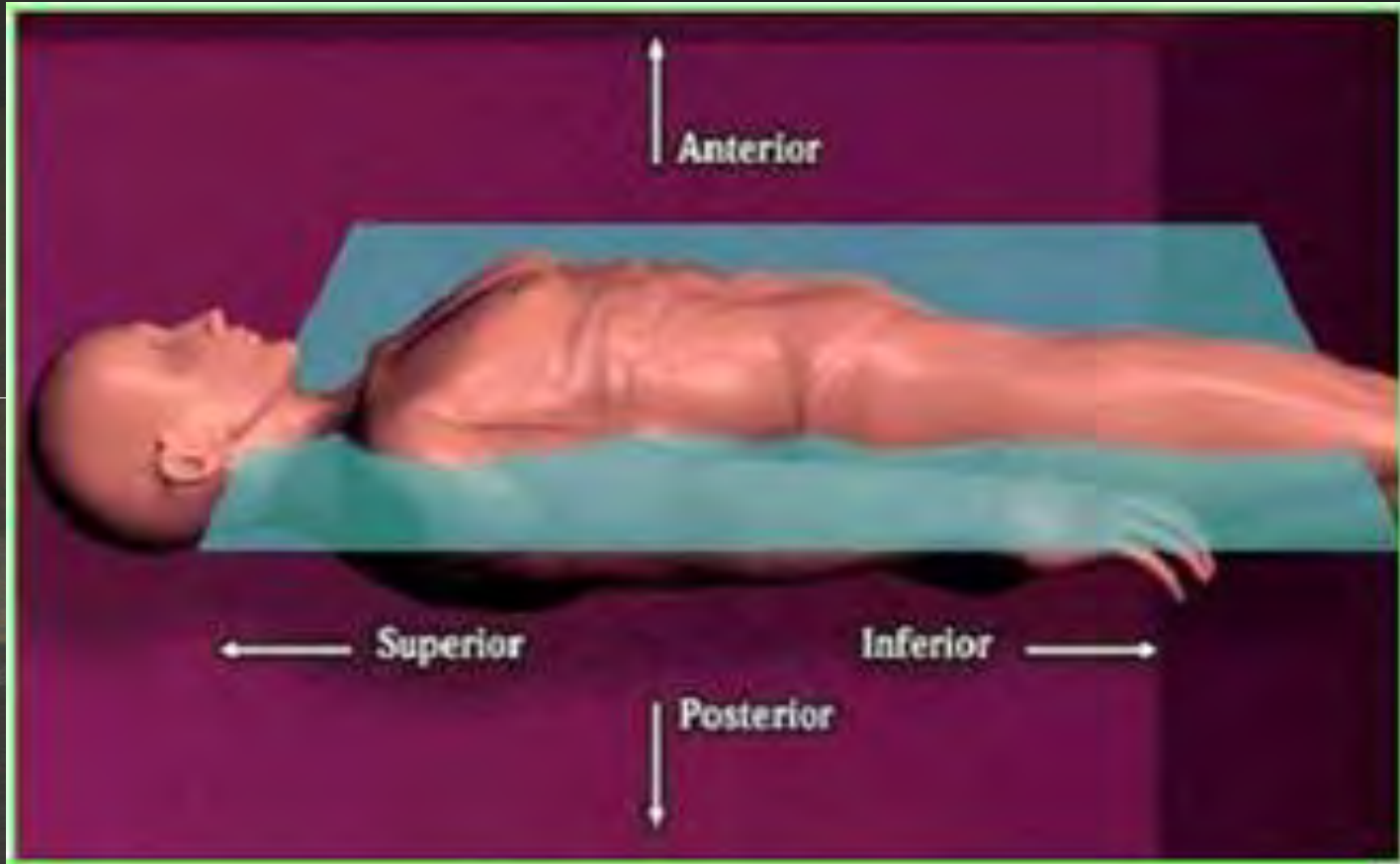


# Transverse Tarama



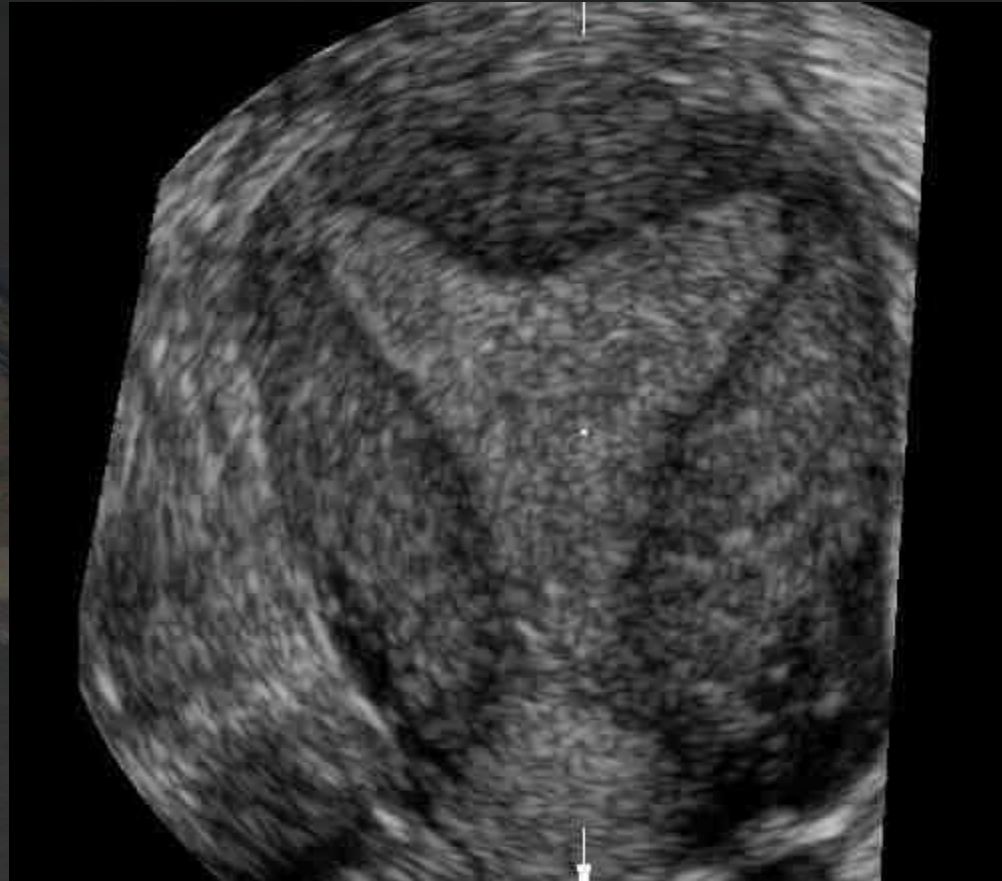


# Koronal tarama



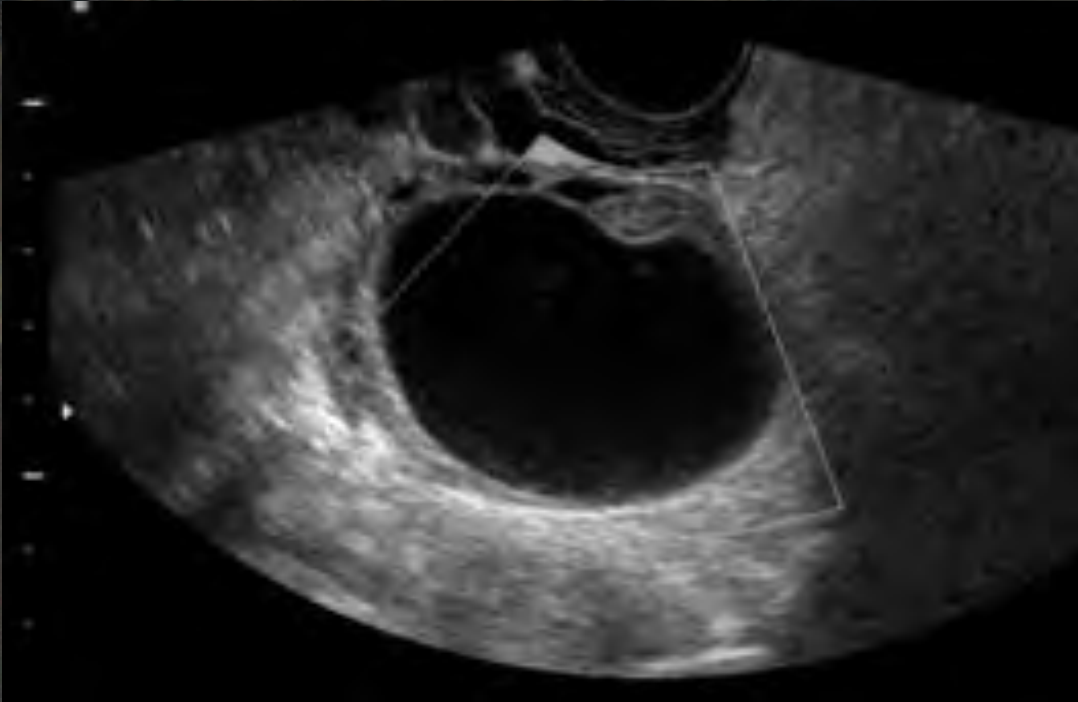


# Koronal kesitte uterus



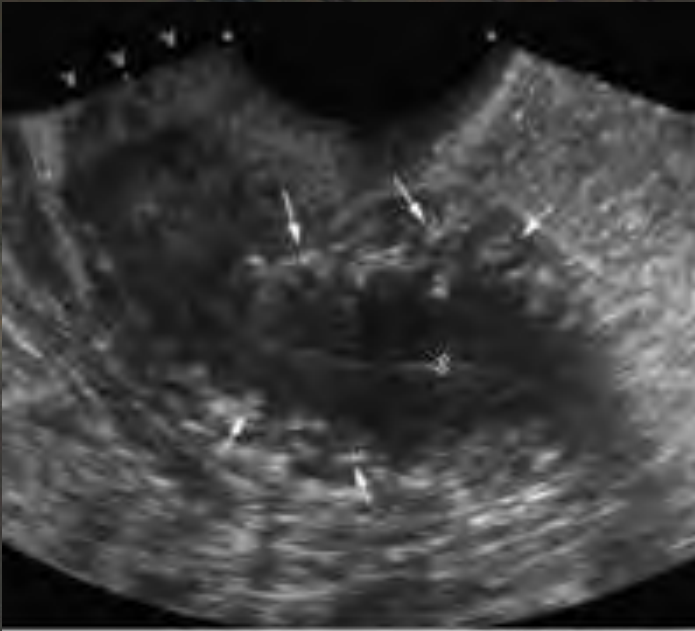


- Anekoik veya sonolüsen - (**görüntüde siyah görünür**), sıvı doludur ultrasonu iyi geçirir (Ekojenik tanımının tersidir)





- Ekojenik veya hiperekojen- (anekoik tersi) ultrason ekosu oluşturur:
- ultrasonu parlak yoğunlukta yansıtır

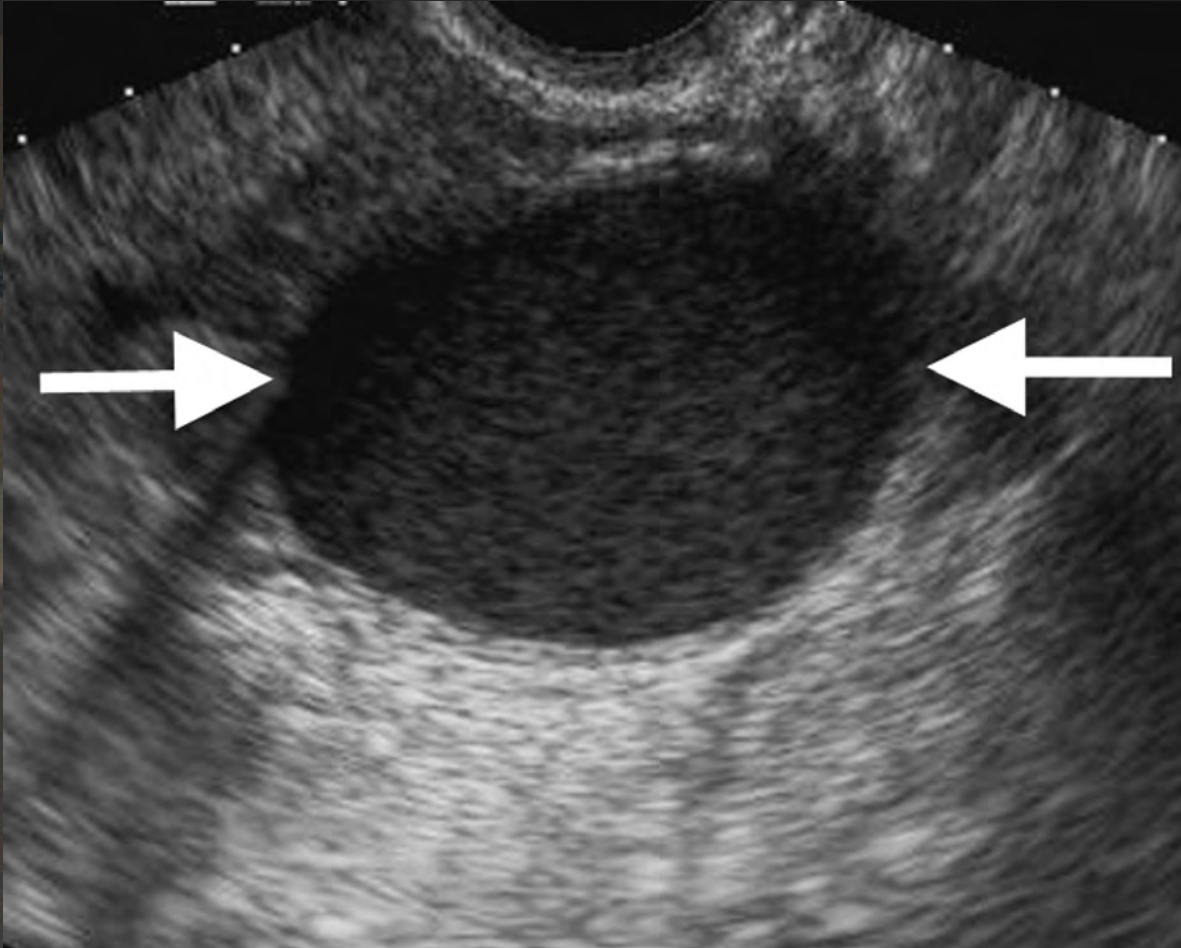




- **Hipoekojen:** düşük ekojenitede, doku parankimleri
- **İzoekojen:** Normal parankim ekojenitesine yakın görüntüler

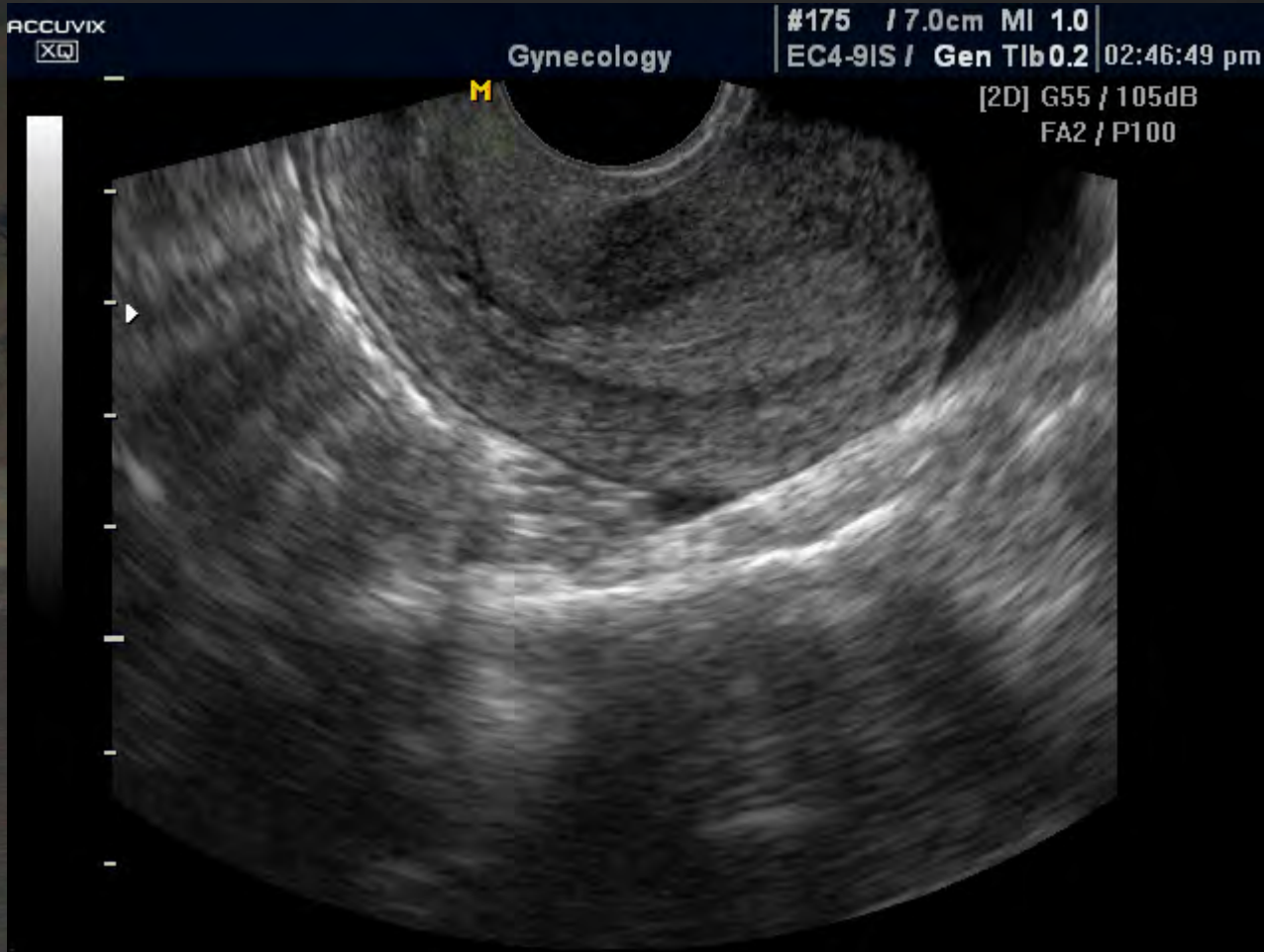


**Hipoekojen:** düşük ekojenitede kist içeriği  
endometrioma





- **Homojen-** (heterojenin tersi) içerik olarak tek tip olan; myometriyum, endometriyum







**Heterojen-** içeriği tek tip olmayan, içeriğinde farklı ekojenitede yapılar bulunan  
**Kompleks-** solid ve kistik alanları bulunan  
**Düzensiz sınırlı x Düzensiz sınırlı**



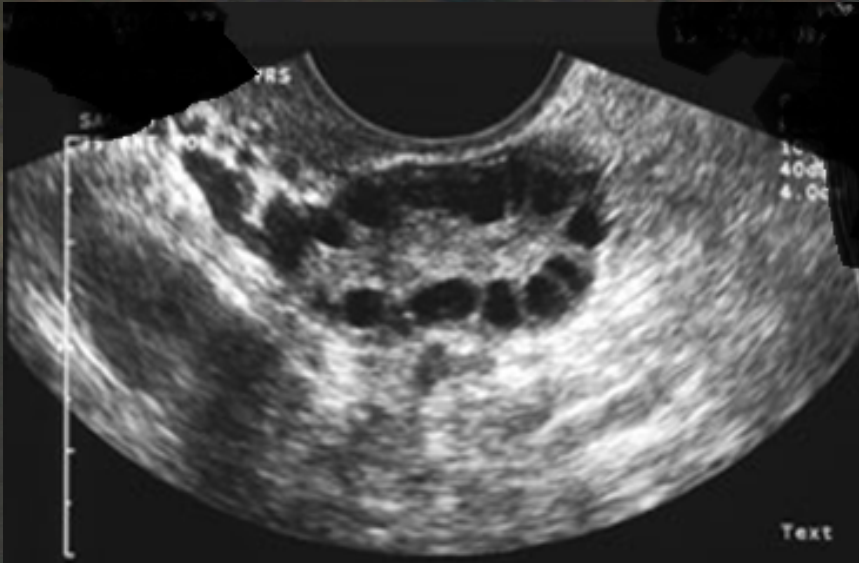
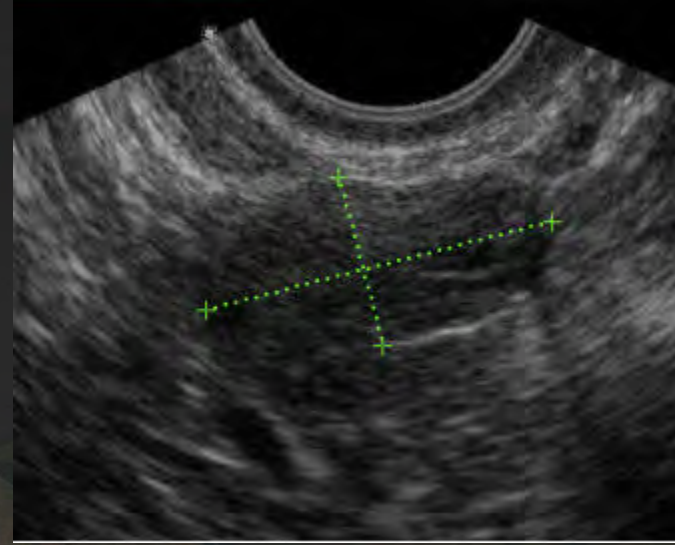


# Normal Anatomi ve Siklus Deęerlendirmeleri





- Siklusun 2-4. günleri
- 2-10mm çaplı folliküller
- Total antral folikül sayısı <4 ise düşük over rezervi
- TAFS > 24 ise OHSS riski artar







ADVANCED FERTILITY CTR OF CHICAGO

ATO

11/12/01 11:28:53

3C6  
GYN

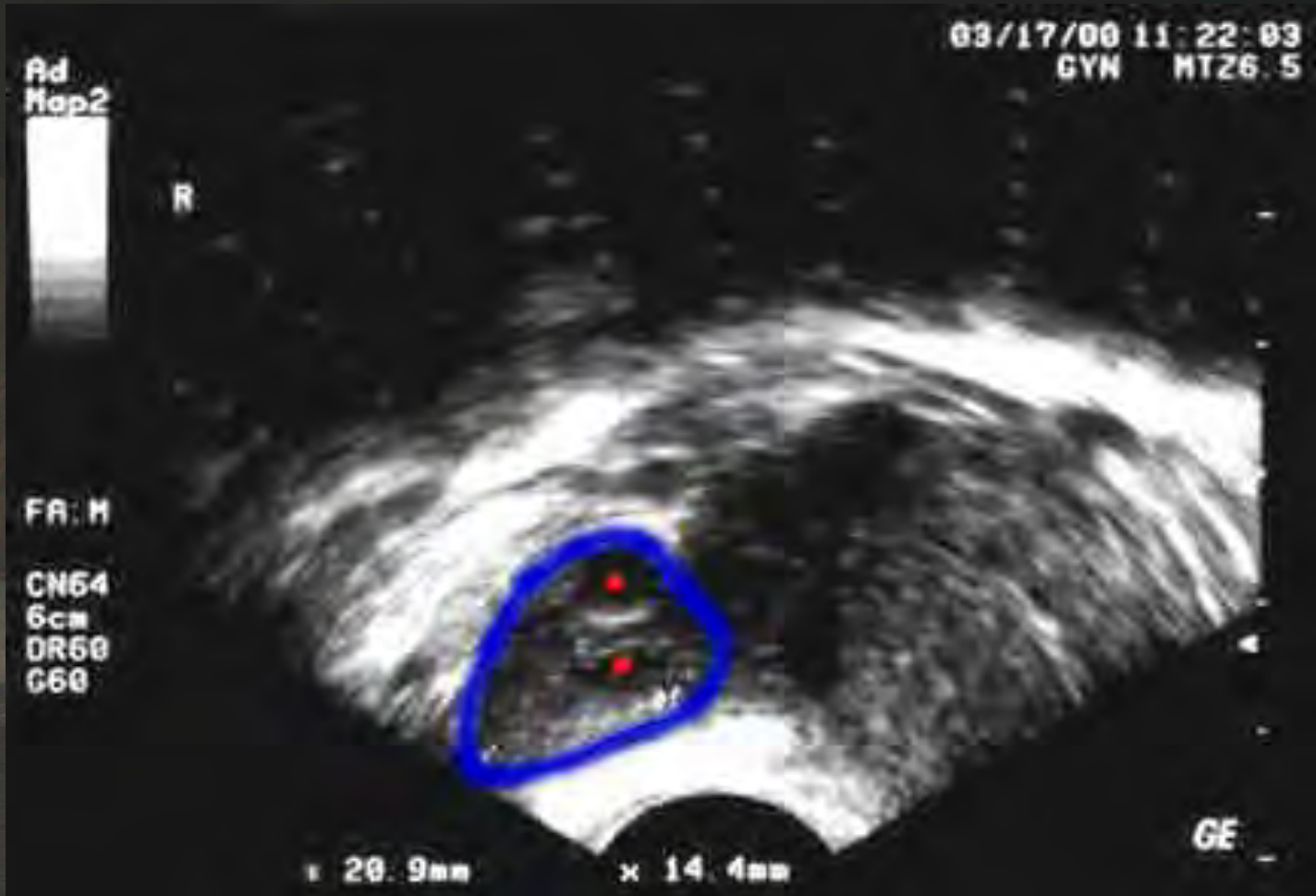
R9

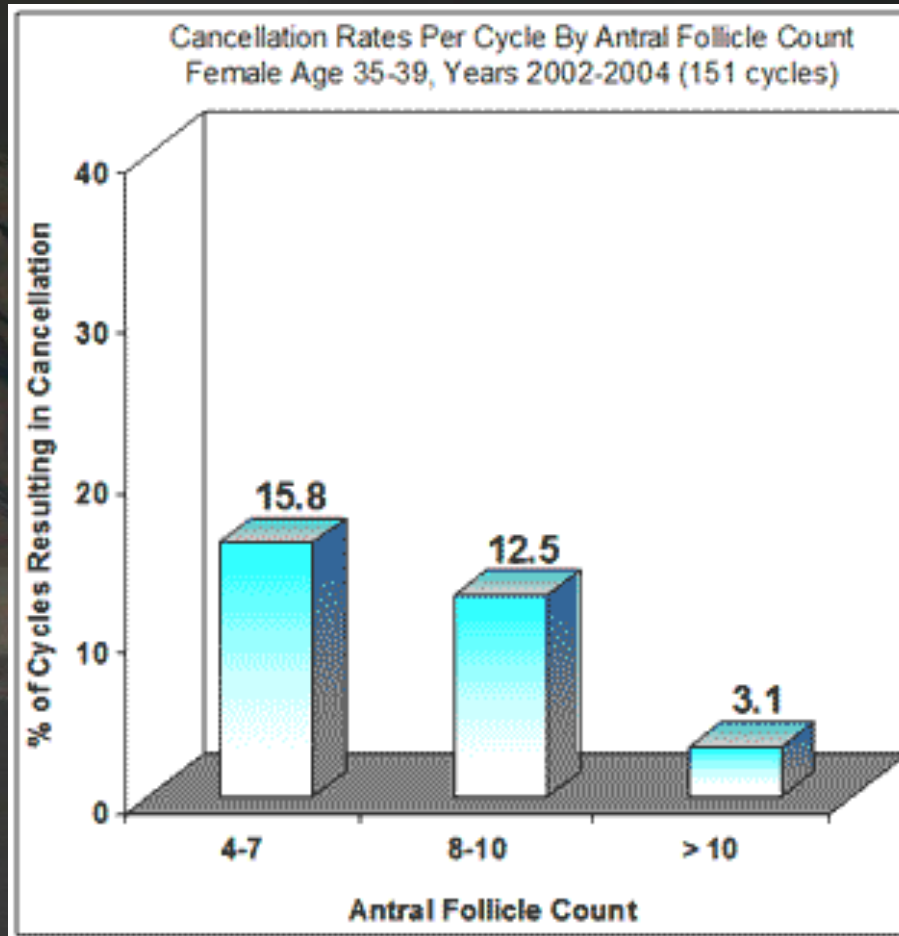
5.5MHz  
FA:M  
EE:L  
CN64  
6cm  
DR66  
G70

+ 30.0mm

17.8mm

GE







# Ovaryan Volüm (d<sub>1</sub>x d<sub>2</sub>x d<sub>3</sub>x 0.5)



OV: 4.5 mL  
AFC: 9



OV: 1.0 mL  
AFC: 1

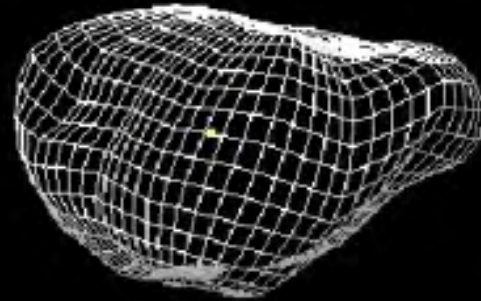


OV: 1.5 mL  
AFC: 2





Kent 06.01.01  
14:48:34





# OHSS riski ve AFC - OV

<b>AFC #</b> <b>(2-6 mm)</b>	< 5: Az      5-15: N > 15: Artmış
<b>Ovaryan volum</b> ( $d_1 \times d_2 \times d_3 \times 0.5$ )	< 3 mL      3-9 : N > 9 mL: Artmış



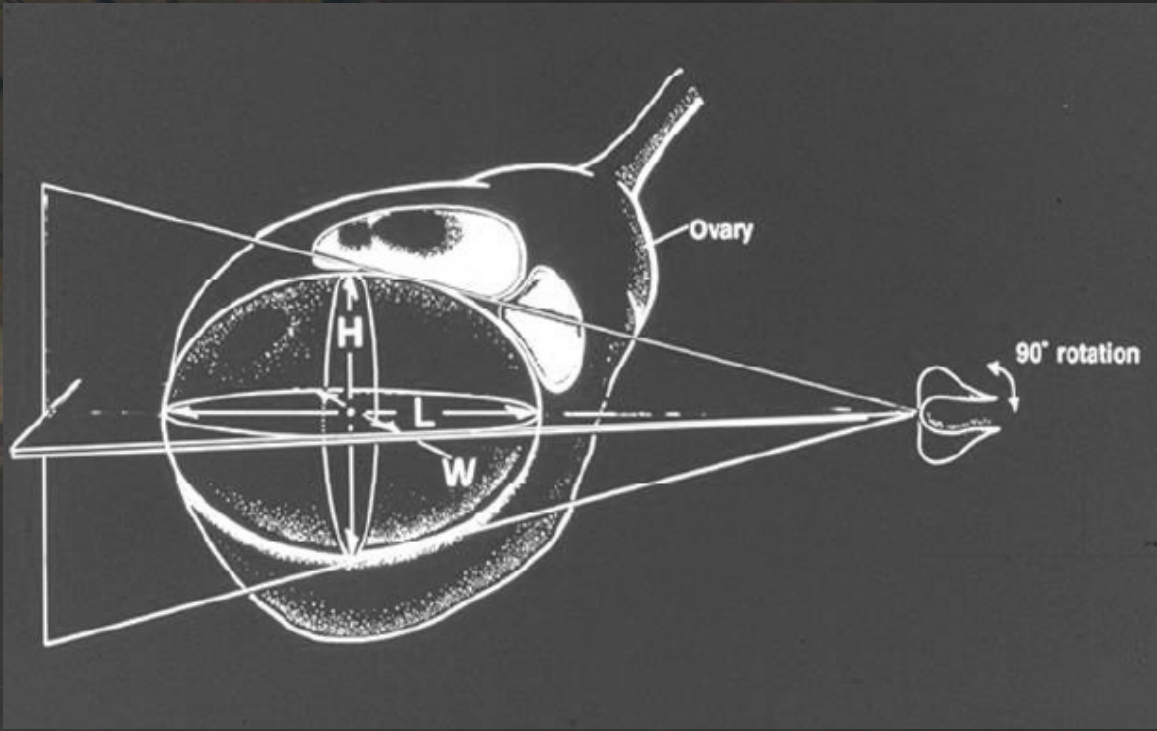
Hafif ovaryan stimulasyon rejimi





# Folikül Ölçümü

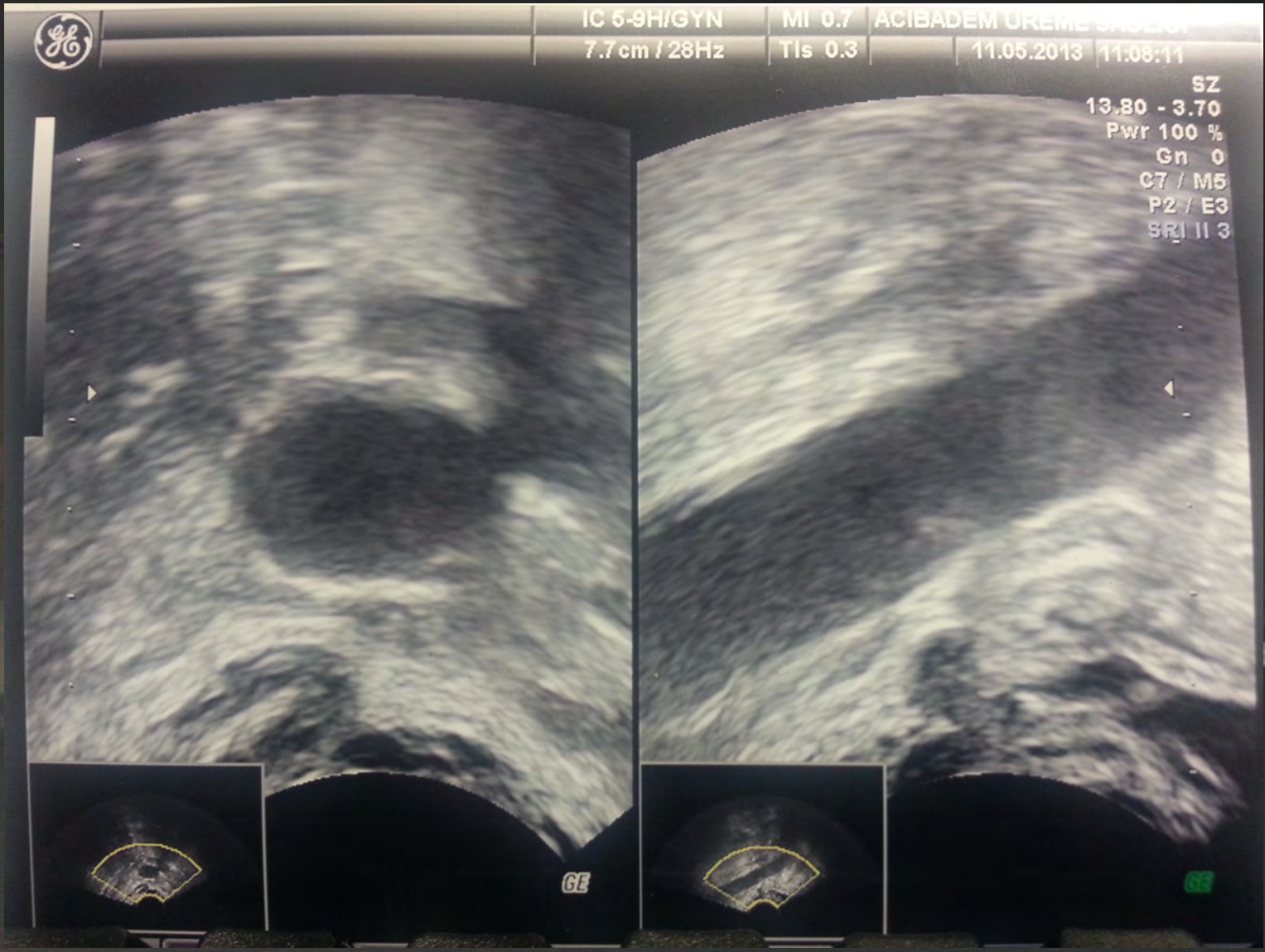
- Maksimum çap
- İki çap (boyut)
- Üç çap (boyut)





# Ovarian foliküllere benzer yapılar

- İnternal iliak arter / ven
- Bağırsak
- Hidrosalpenks
- Over kisti
- Paratubal kist





# Foliküler büyüme

- Ortalama 1.5- 2 mm/gün
- Folikül çapı  
14 – 24 mm
- 24 mm nin üzerinde oosit elde etme oranı ve fertilizasyon oranı düşmekte



# Sono - AVC

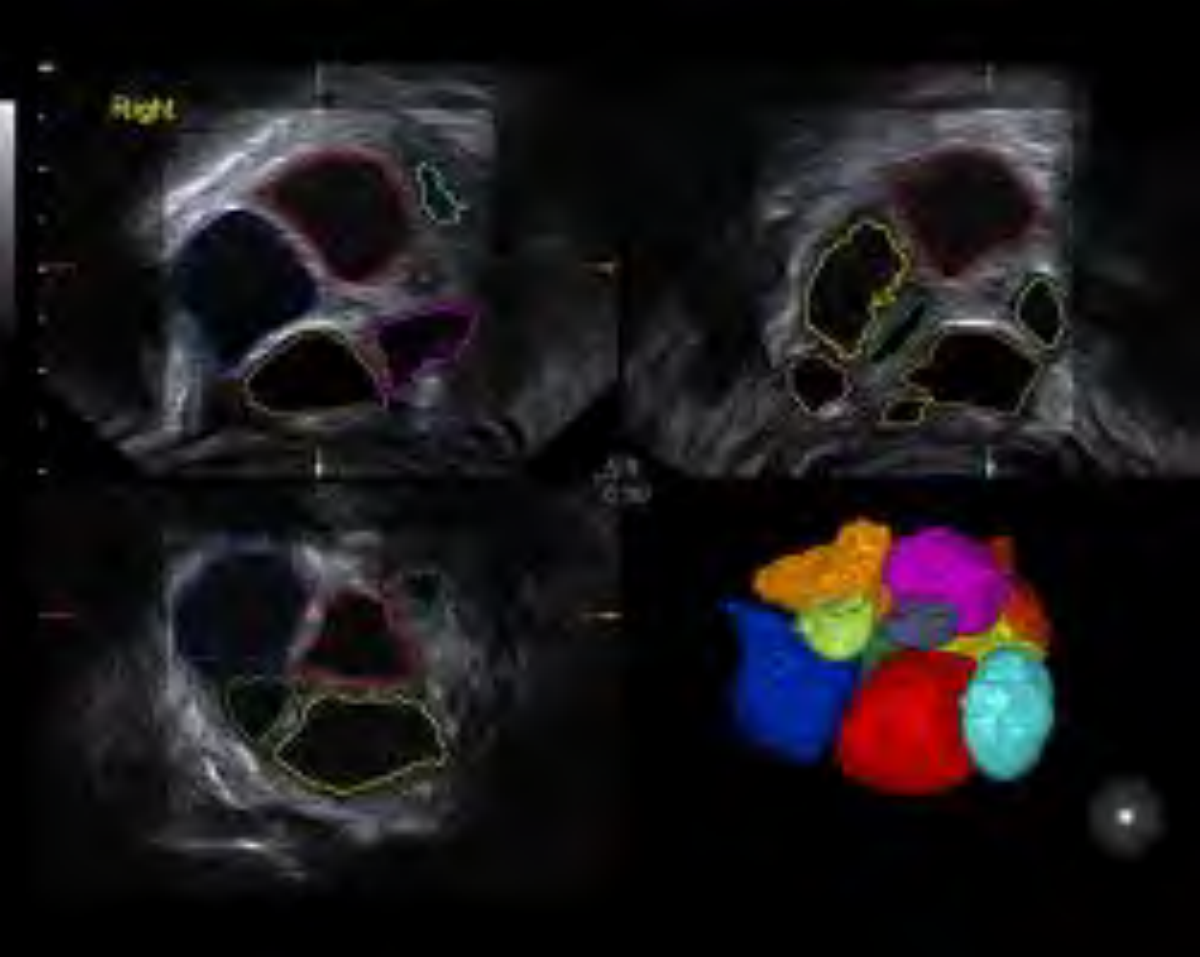
Sono-AVC has been used to automatically calculate the mean relaxed sphere diameter (dV) and the mean diameter (m-d) calculated from the maximal dimensions (dx, dy, dz) of the follicles.

The screenshot displays the Sono-AVC software interface. At the top, it shows the GE logo, patient information (RIC 5-9/GYN, University of Nottingham), and scan parameters (0.1/ 4.0cm / 32Hz, 06.03.2007, 09:51:31). The main area contains three ultrasound images of follicles, with one highlighted in red. A 3D reconstruction of the follicles is shown in the bottom right. The right panel contains a data table and control buttons.

Nr	d(V)	dx	dy	dz	m-d	V
1	26.3	33.9	28.4	19.8	27.4	9.52
2	21.9	31.8	20.6	17.8	23.4	5.48
3	16.5	25.9	16.1	12.2	18.1	2.37

Control buttons include: Ovary (Left, Right), Total Amount (3), Rel Image (A, B, C, 3D), Init (All, 3D tilt, Sect. Plan.), Display (Filled, Boundary), Edit Mode (on, off, Merge), Undo All, Undo, Redo, Measure, Add to Report, Edit ROI, and MAIN MENU. Sliders for Rotation X, Y, Z, Magn (1.00), Th Low (80), Growth, and Separation are also present.







# Endometrium Kalınlığı

- 1-4 mm menstrüel dönem,
  - 4-8 mm midproliferatif dönem,
  - 8-14 mm geç folliküler faz,
  - 7-14 mm sekretuar faz
- 
- hCG günü endometrium  $> 7$  mm

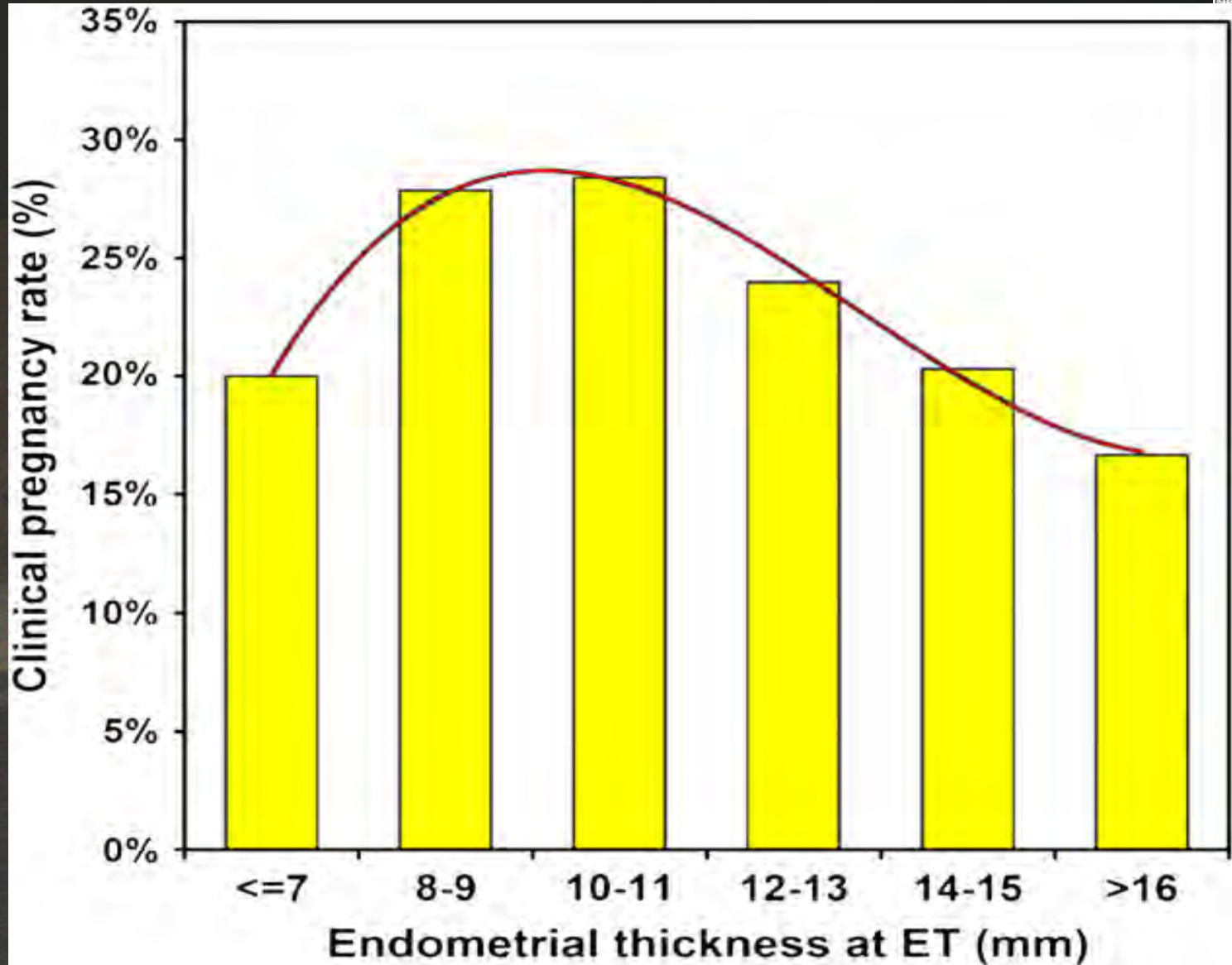
❖ Oliveira JB, et al. Endometrial ultrasonography as a predictor of pregnancy in an in-vitro fertilization programme after ovarian stimulation and gonadotrophin-releasing hormone and gonadotrophins. *Hum Reprod* 1997

❖ Schild RL, et al. Endometrial receptivity in an in vitro fertilization program as assessed by spiral artery blood flow, endometrial thickness, endometrial volume, and uterine artery blood flow. *Fertil Steril* 2001



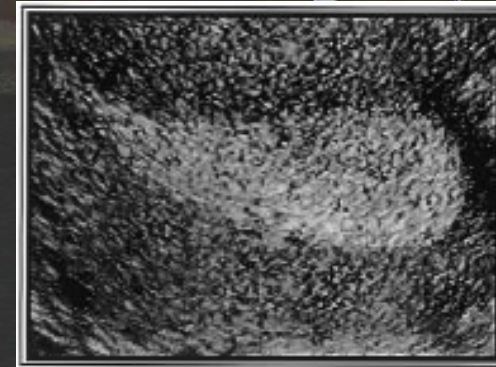
# Endometrial kalınlık

- Azalmıř gebelik – artmıř dūřük řansı
  - < 5 mm
  - < 6 mm
  - > 13 mm
  - > 14 mm
  - > 18 mm
  - Üst sınır ??



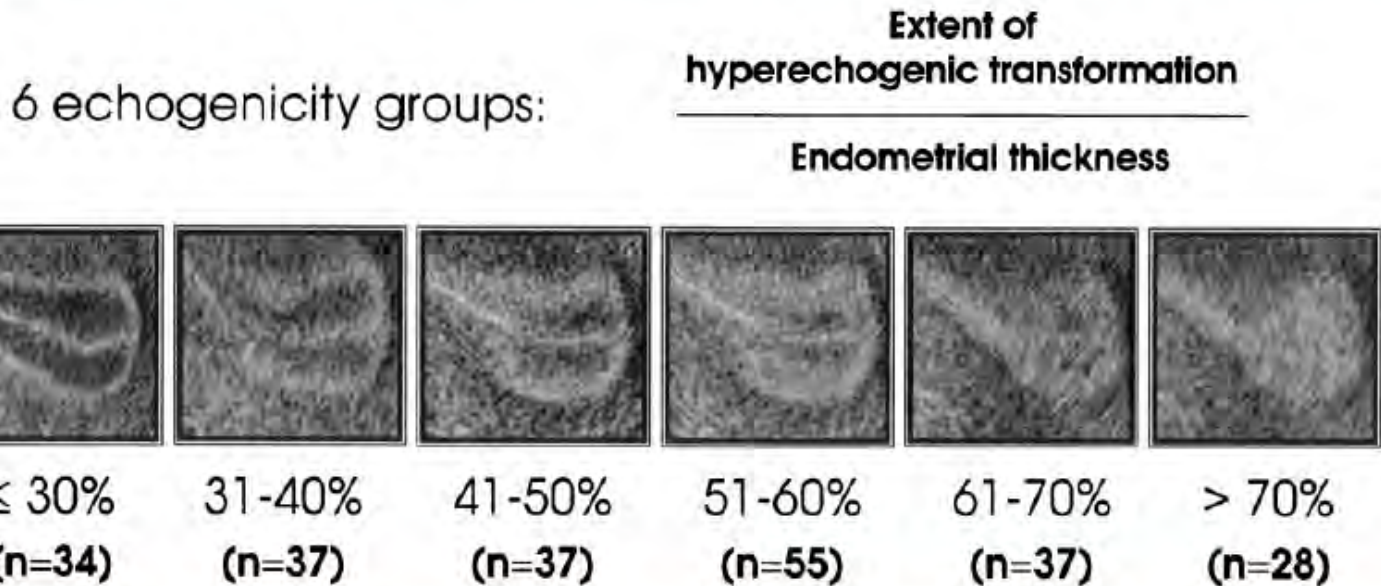
# Endometrial Görünüm

- Hipoekoik yapı:  
Proliferatif faz; merkezi  
ekojenik çizgi
- Homojen hiperekojen  
yapı: Sekretuar faz;  
merkezi ekojen çizgi yok



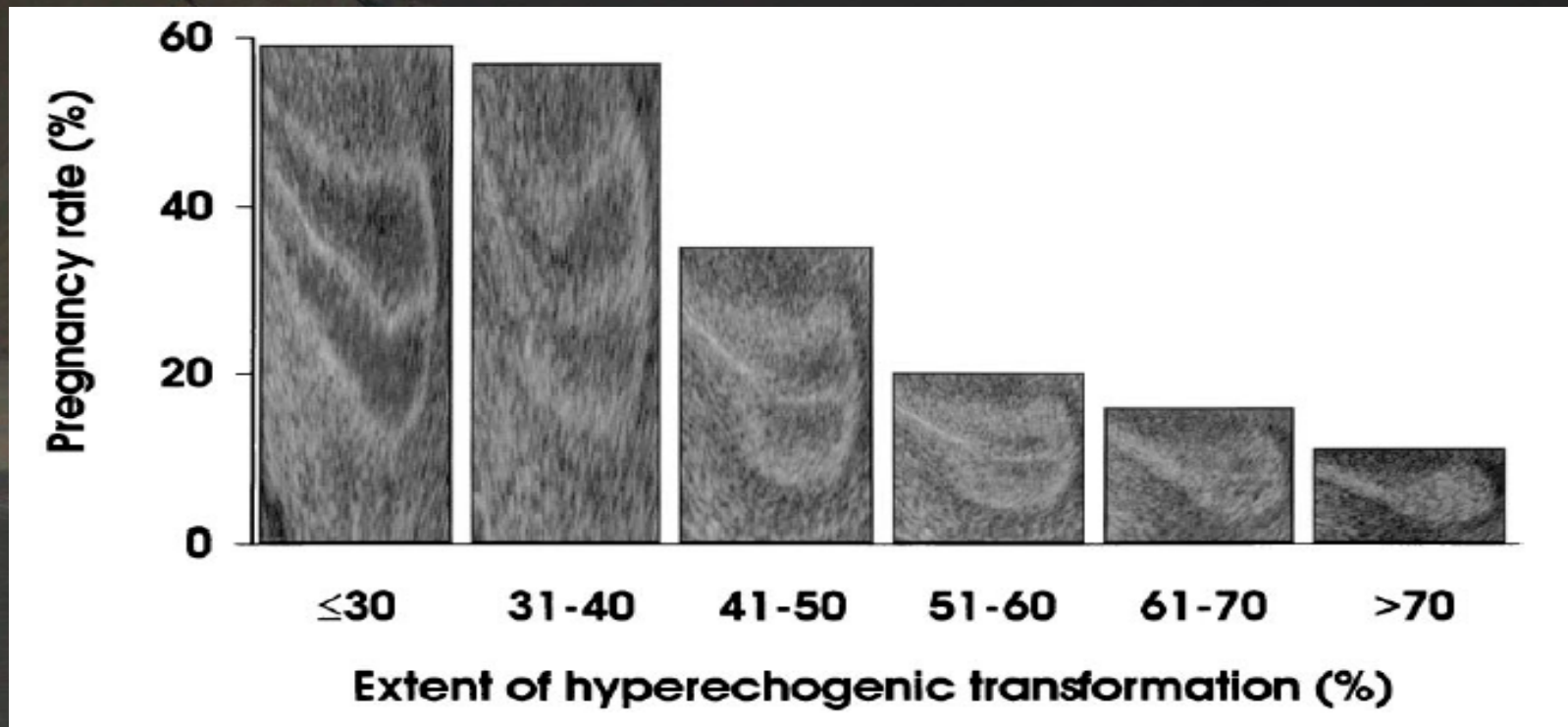
**FIGURE 2**

The cycles were sorted into six groups according to the extent of the upward hyperechogenic transformation of the endometrium.



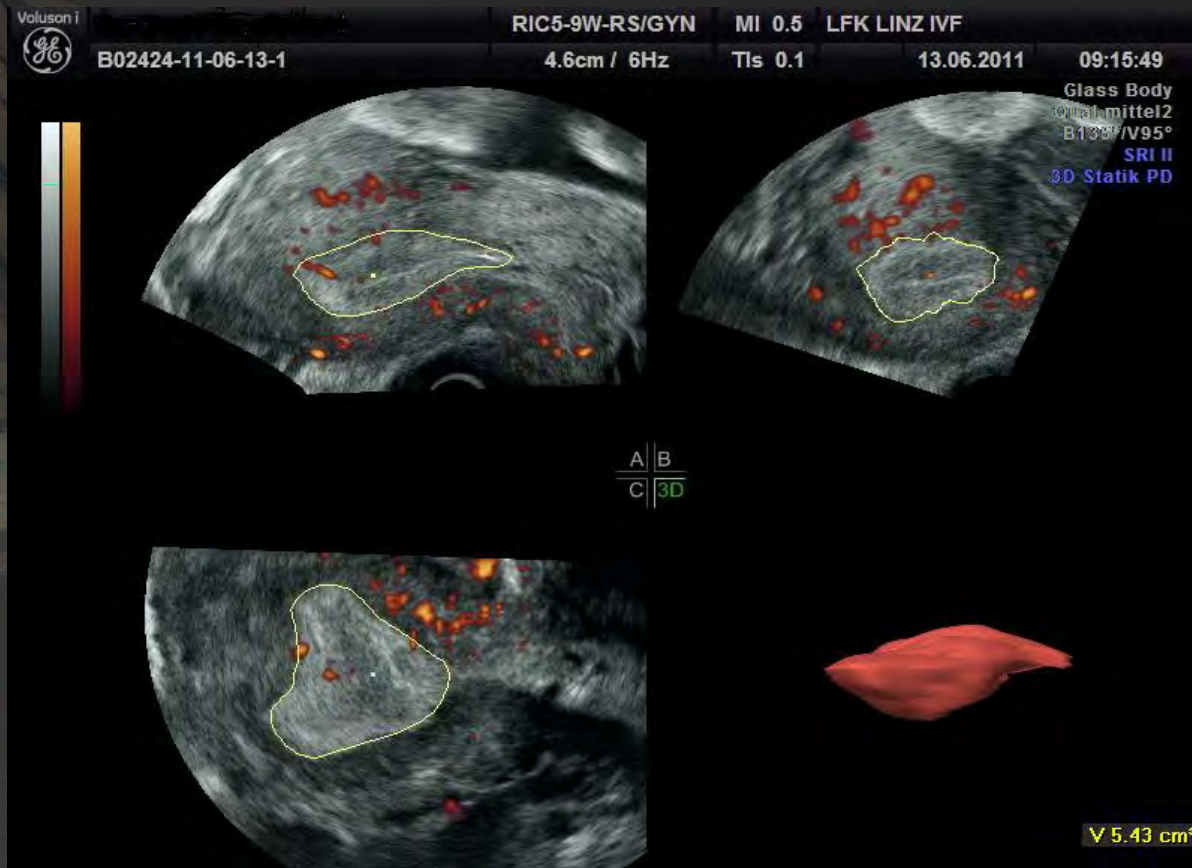


hCG günü endometriyumda hiperekojenik transformasyonun genişliği ve gebelik oranı ( $p < 0.001$ )





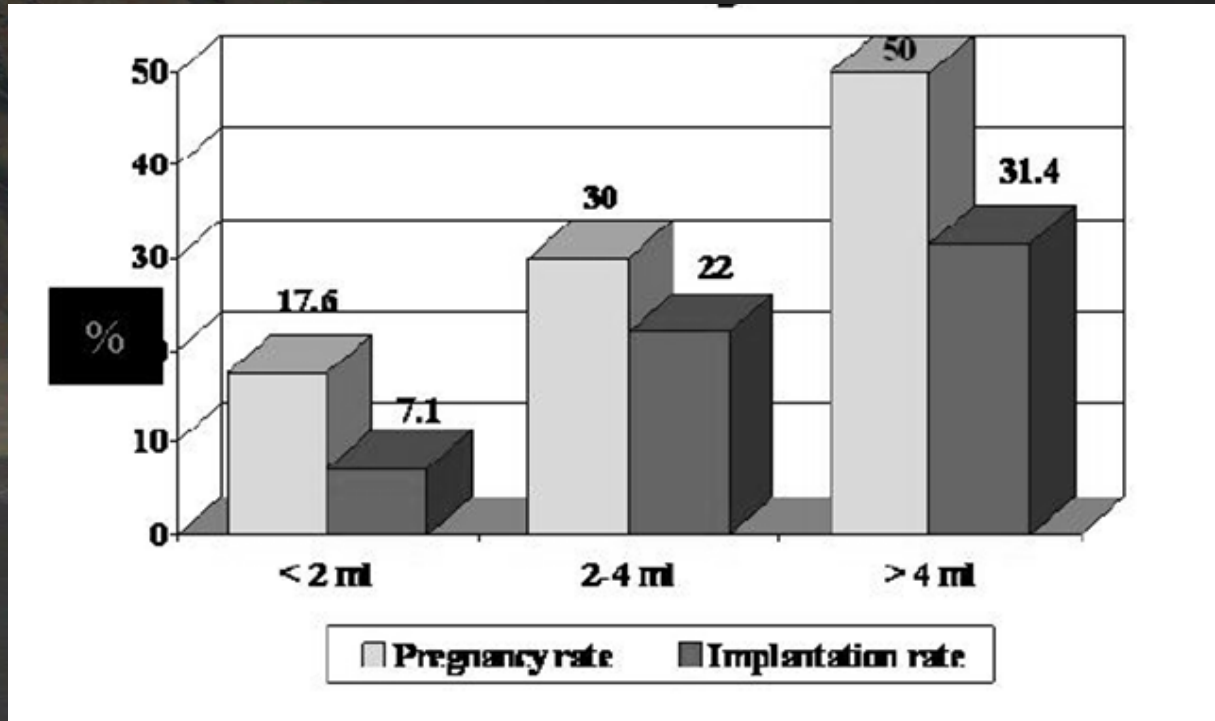
# Endometriyal Hacim







# Embriyo Transfer Günü Hacim Gebelik İlişkisi





## Doppler ve Endometrial Reseptivite

- Power doppler ile endometrial ve subendometrial kan akımı ;
  - Foliküler fazda artar,
  - Yaşlı kadınlarda düşer,
  - İmplantasyon için tanısal yeteneği zayıftır,

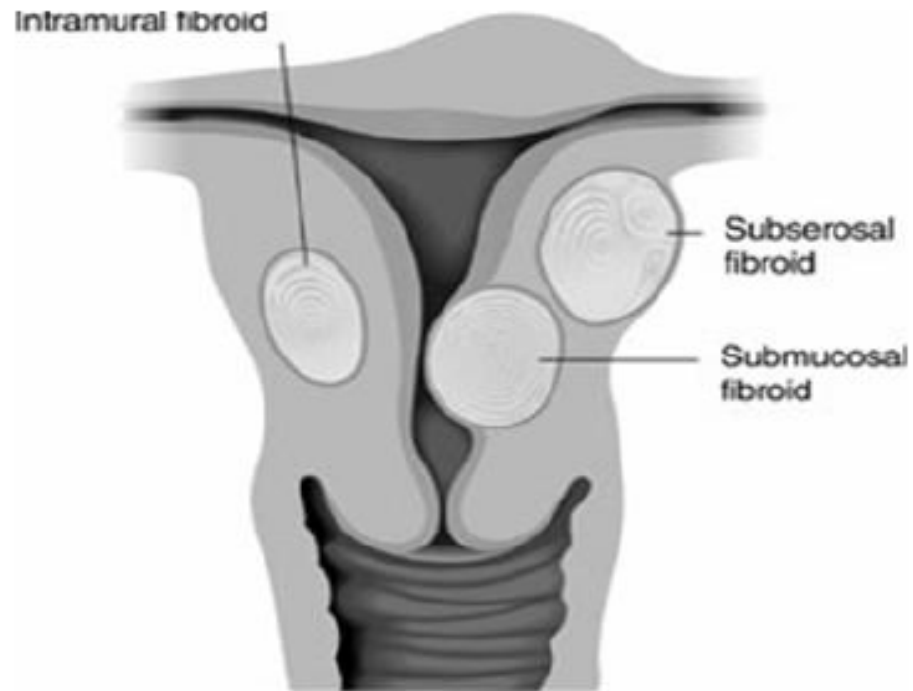


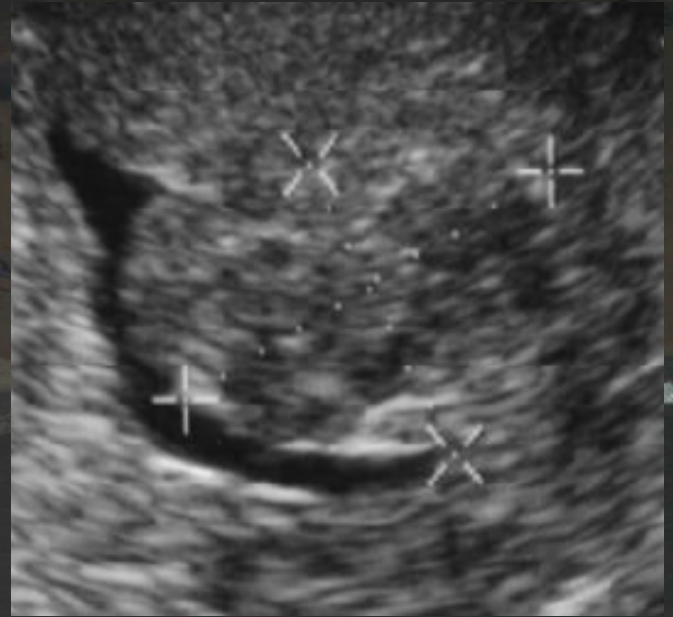
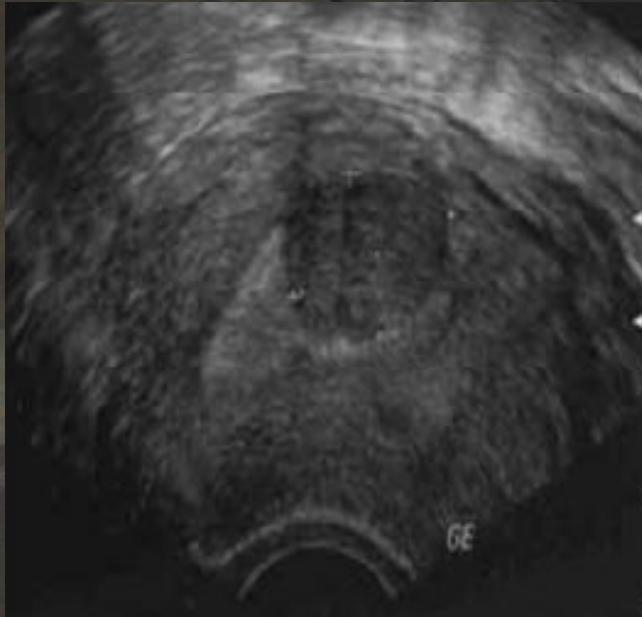
# Patolojilerin Tanı ve Sınıflamasında Ultrasonografi



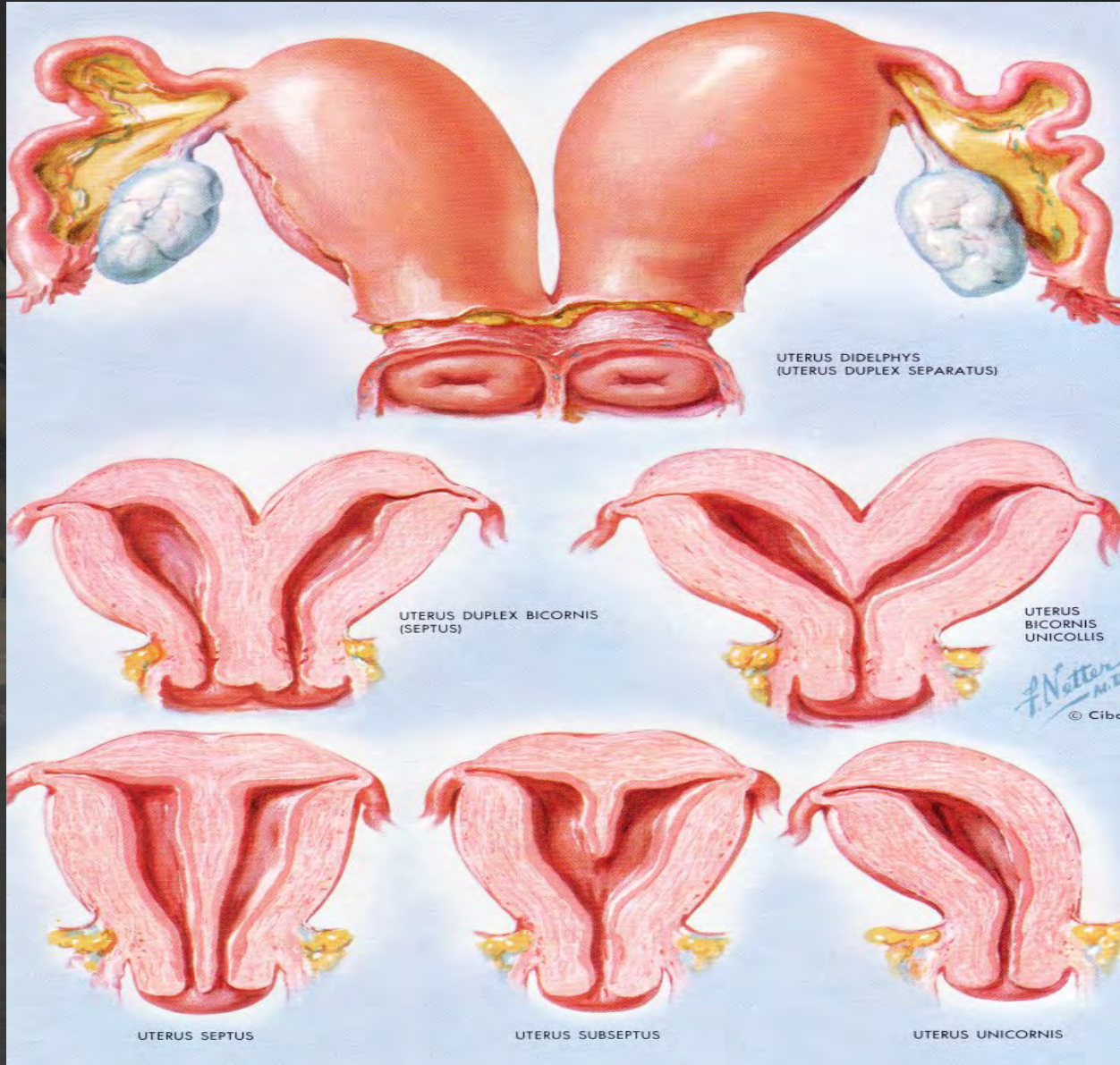


# Myoma Uteri





# Congenital Anomalies





## Uterus Anomalisi Şüphesi Olanlar

- USG ile uterus anomalilerinin saptanmasında
  - 2D duyarlılık %88 özgüllük %94
  - 3D ultrasonografi ile duyarlılık ve özgüllük %98-100
- MRG ile duyarlılık ve özgüllük %100
- Tanısal laparoskopinin yeri:
  - Histeroskopik işlemlere eşlik etmek
  - Semptomatik olgularda tanı ve tedavi sağlamak



# 3D veya 4D ULTRASON

- L/S ve H/S ile karşılaştırıldığında yüksek doğruluk (92%)

Raga et al, Fertil Steril, 1996

- Aynı uygulayıcı için uyumluluk yüksek (kappa:0.97)

Salim et al, Ultrasound Obstet Gynecol, 2003

- Uygulayıcılar arası değişkenlik düşük

Salim et al, Ultrasound Obstet Gynecol, 2003





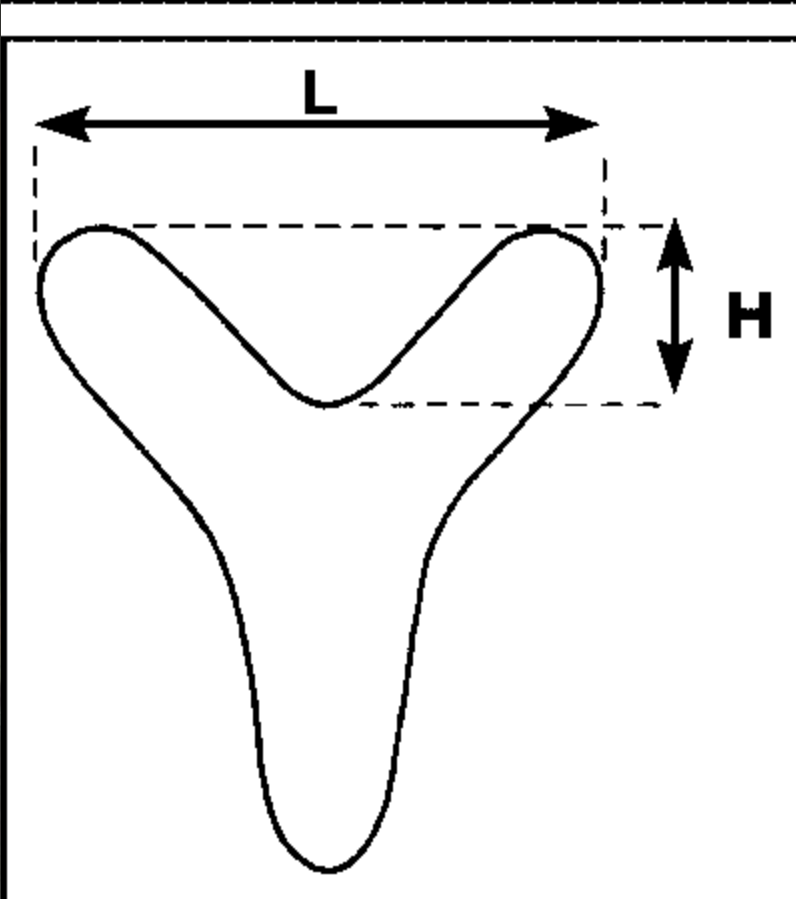
- ❖ Hysterosalpingografi: Bikorn ile septumu ayırmada doğruluk oranı %55 tir.
- ❖ Hysteroskopi: Tanısal değeri HSG den iyidir. Aynı zamanda tedaviyi sağlar.
- ❖ Kombine laparoskopik ve hysteroskopik inceleme bikorn uterusla, uterus septusu ayırmada ve uterin anomalileri tanımada GOLD standarttır.

❖ *Hayden A. Homer, et al:*The septate uterus: a review of management and reproductive outcome. (Fertil Steril 2000;73:1–14.



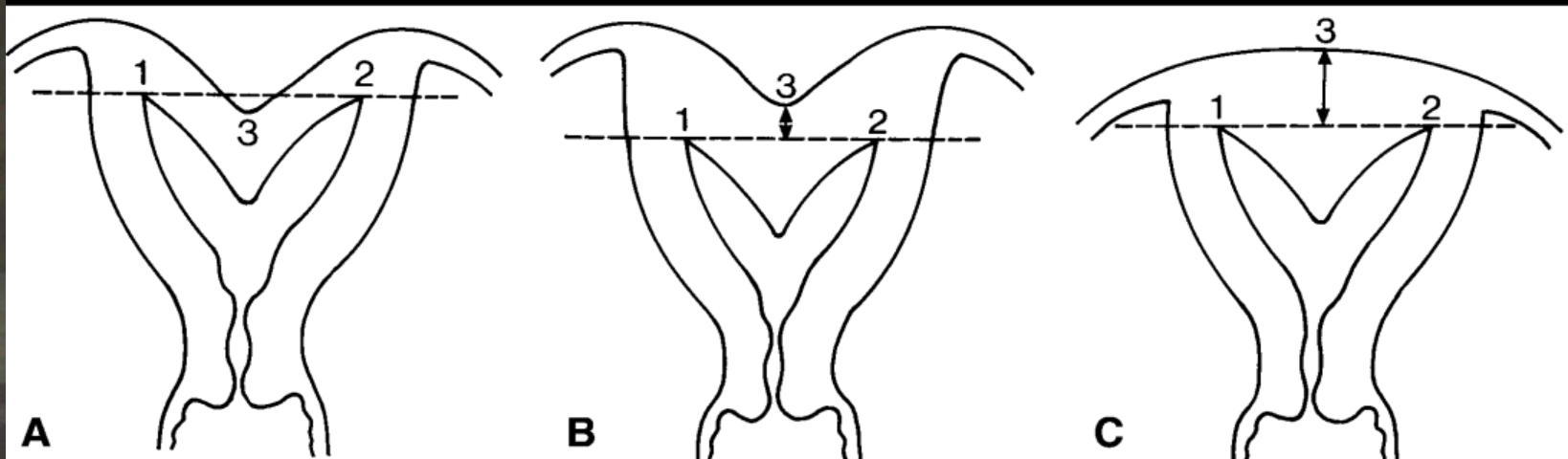
Diagram of arcuate uterus ratio. When ratio of height ( $H$ ) to length ( $L$ ) is less than 10%, an adverse reproductive outcome is not expected. (Reprinted, with permission, from reference)

Arcuate uterus. Transverse fastspin-echo T2-weighted MR image (6166/130) demonstrates nonspecific low signal intensity of fundal myometrium (arrow)

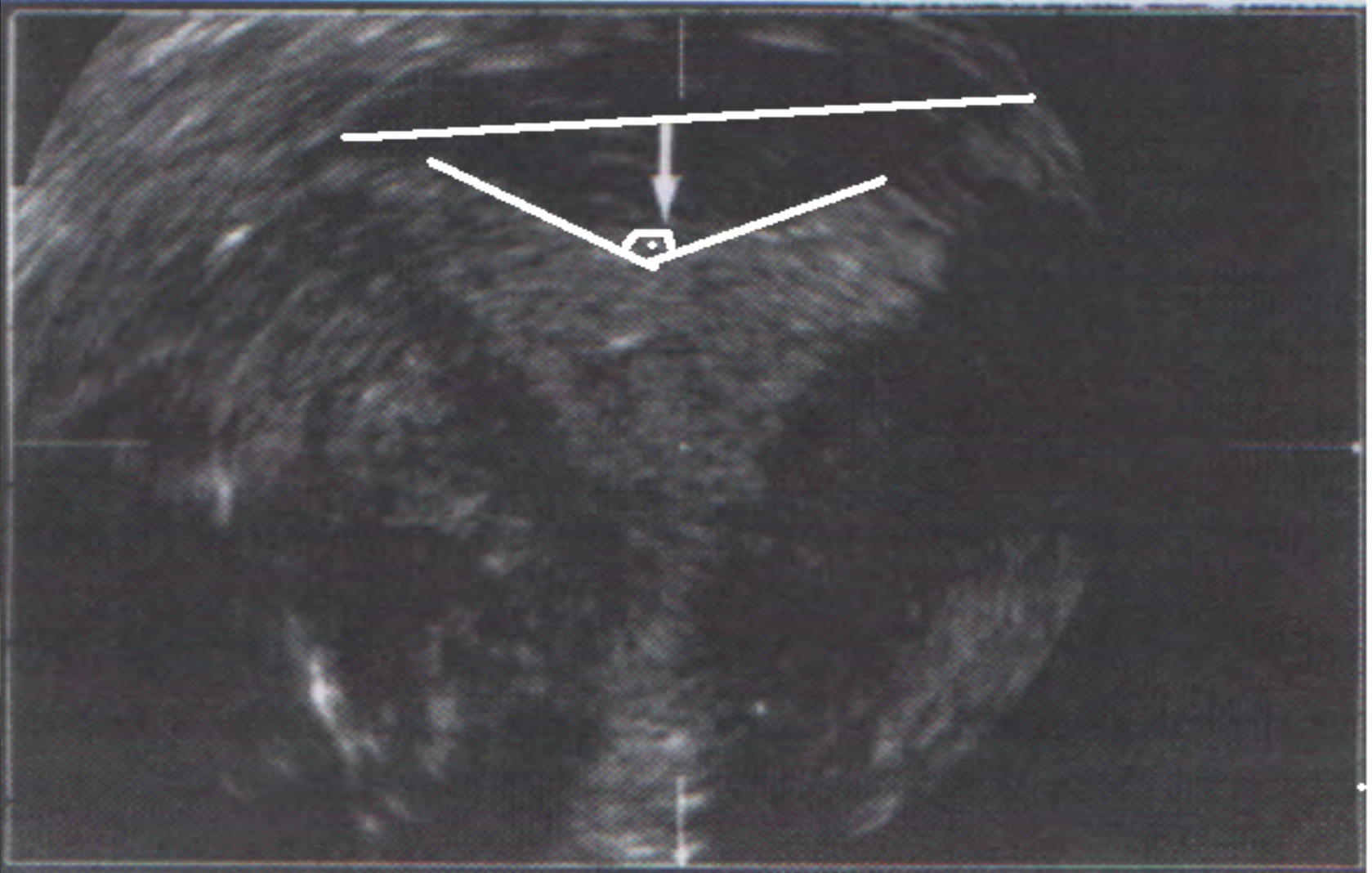




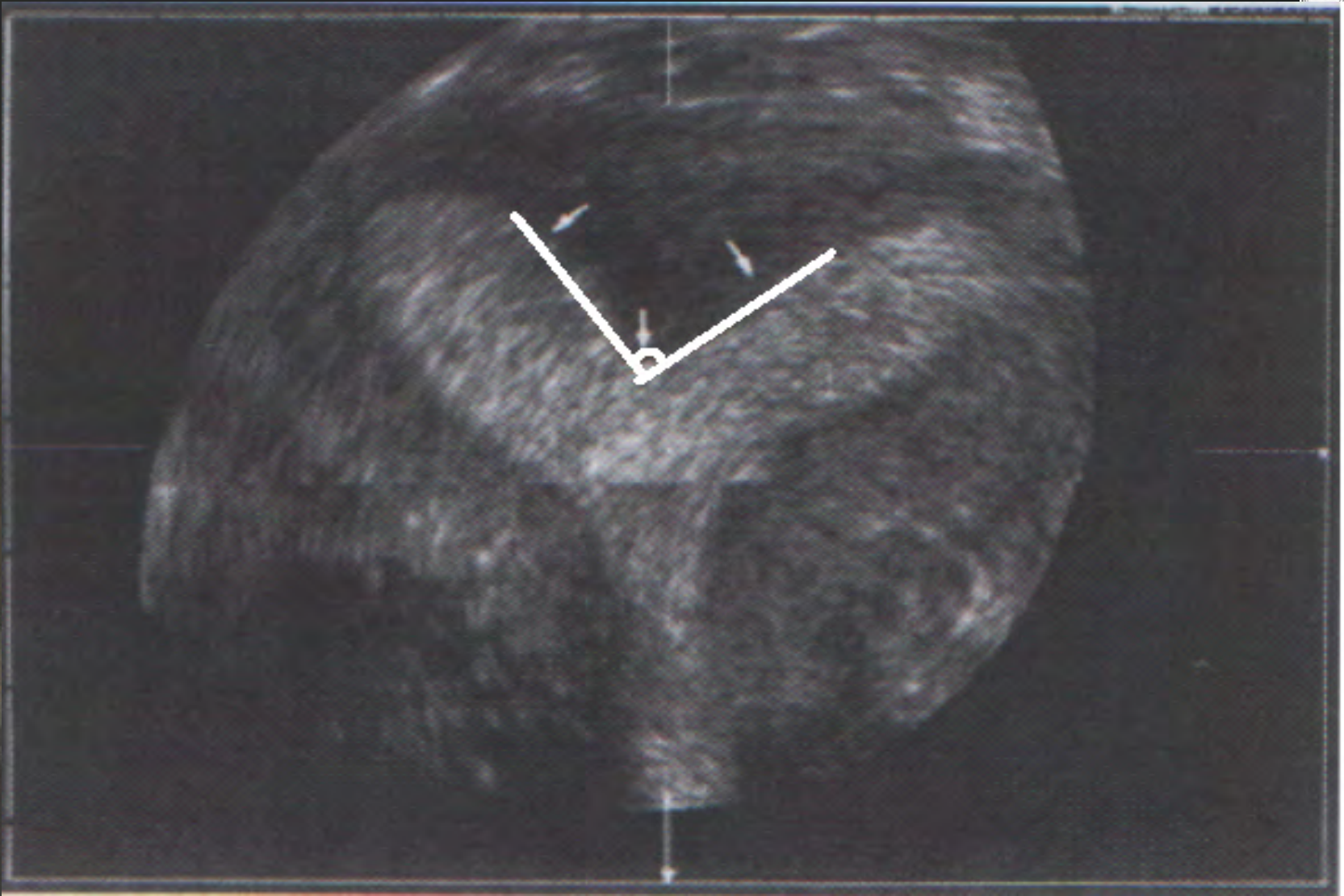
**F Classification criteria for US differentiation of septate from bicornuate uteri. A, When apex (3) of the fundal external contour occurs below a straight line between the tubal ostia (1, 2) or, B, 5 mm (arrow) above it, the uterus is bicornuate. C, When apex is more than 5 mm (arrow) above the line, uterus is septate.**



Robert N. Troiano, MD Shirley M. McCarthy, MD, PhD : Mullerian Duct Anomalies: Imaging and Clinical Issues *Radiology* 2004; 233:19–34



Wu et al, J Clin Ultrasound, 1997

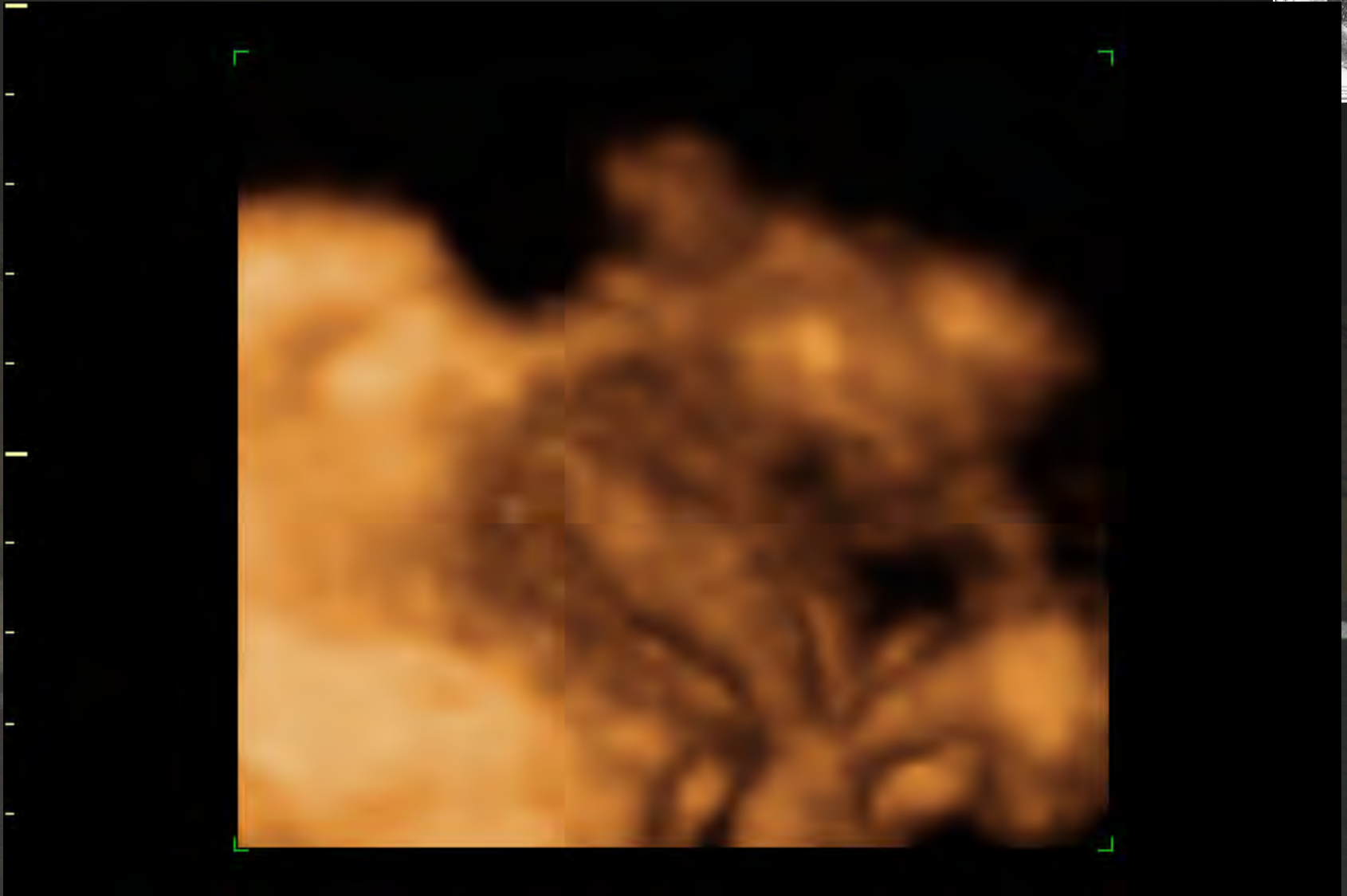


Wu et al, J Clin Ultrasound, 1997

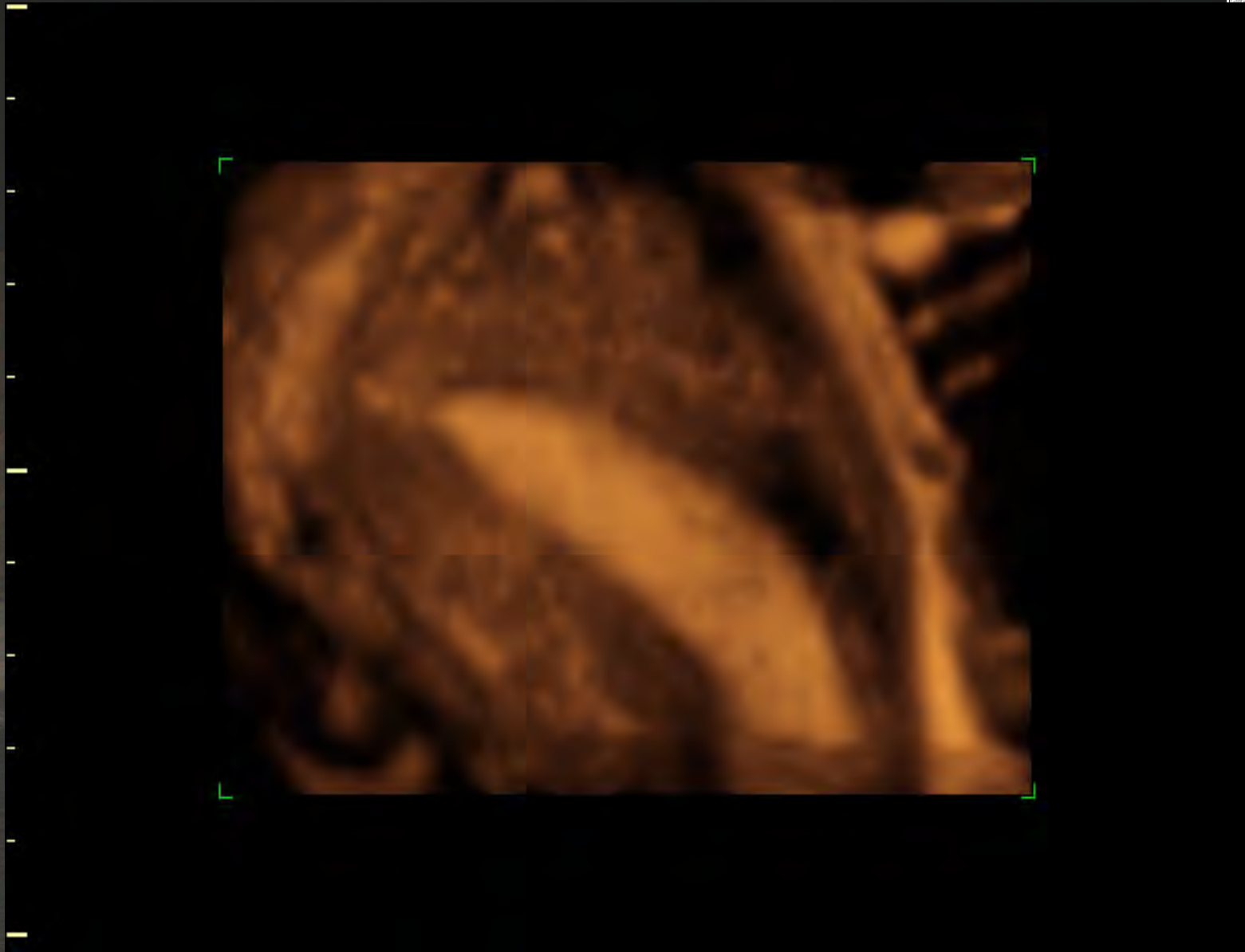


## 3D-4D ULTRASONOGRAFİ İPUÇLARI

- Transvajinal 3D transabdominalden daha iyi
- Ultrasonografiyi luteal fazda endometriyum kalınken uygulayın
- Transabdominal ultrasonografide mesane yarı dolu olmalı
- Transverse veya coronal kesit elde etmeye çalışın
- Video opsiyonu ve obstetrik modları kullanın



Caliskan E et al, J Clin Ultrasound, 2010

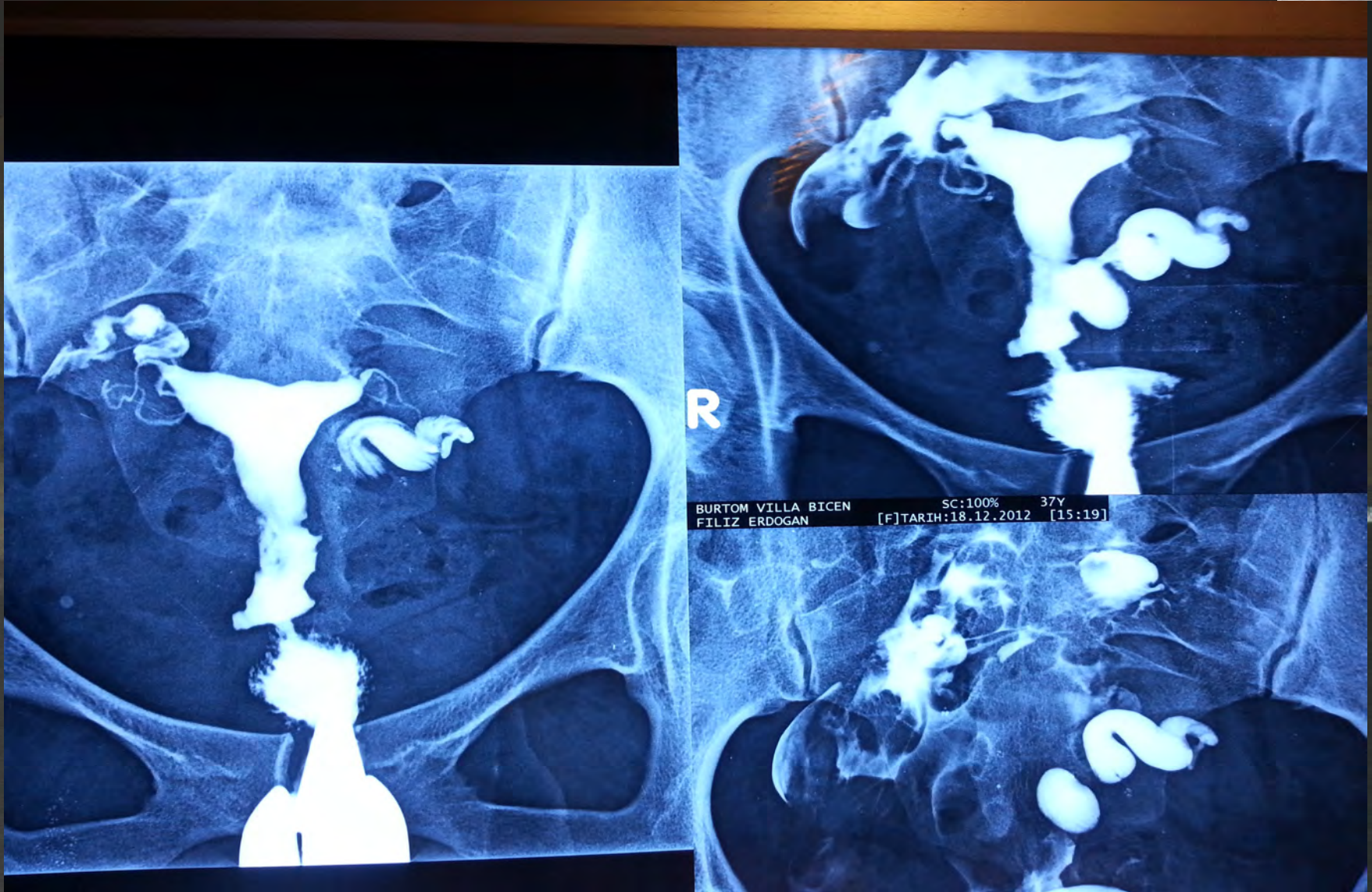


Caliskan E et al, J Clin Ultrasound, 2010





# Hydrosalpinx

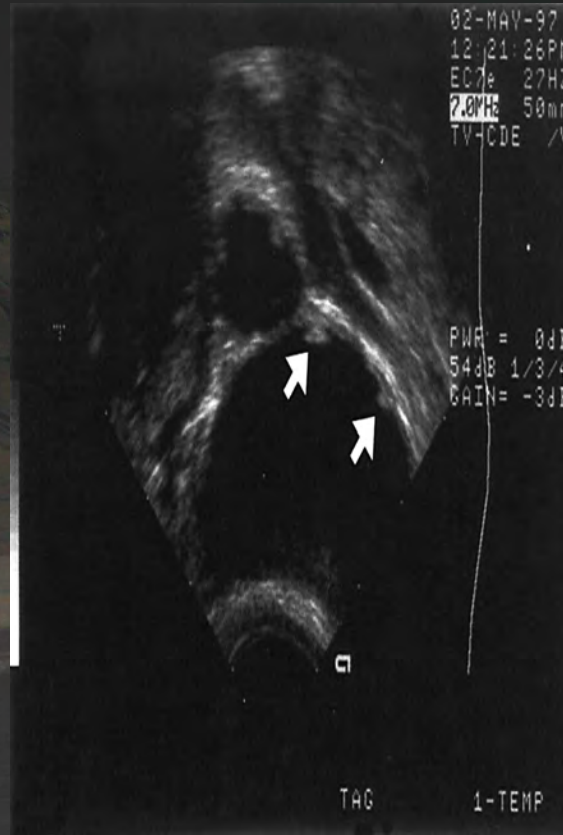




# Hidrosalpinks



Elonge kitle (kangallaşma)  
İnkomplet septasyon



Tespit tanesi:  
Beads-on-a-string

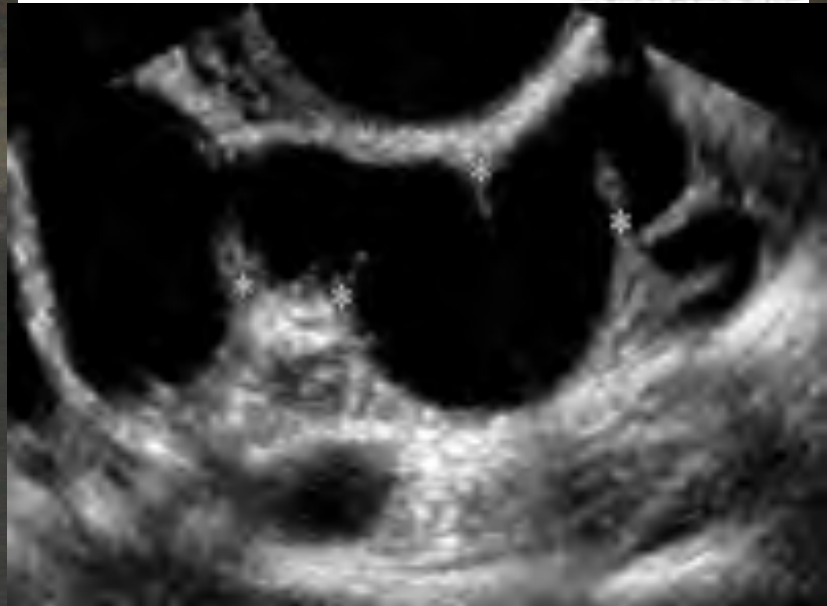


Zayıf vaskülarizasyon

(Guerriero, S. et al. Hum. Reprod. 2000 15:1568-1572)



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01-15-5

1.0/ 4.8cm / 55Hz

TIs 0.4

15.07.2013

13:38:13

S  
13.80 - 3.7  
Pwr 100  
Gn  
C7 / M  
P2 / E  
SRI II







## IMPLANTATION RATES AFTER LS SALPINGECTOMY VS NO INTERVENTION BEFORE IVF

Table VI. Mean implantation rates (IR) (of each individual's mean implantation rate) in all transfer cycles in the total study population and in subgroups of patients with bilateral and ultrasound-visible hydrosalpinges in the two treatment groups

Study group	Laparoscopic salpingectomy <sup>a</sup>			No intervention before IVF			<i>P</i>	Bonferroni-Holm adjusted <i>P</i>
	<i>n</i>	Mean IR	(SD)	<i>n</i>	Mean IR	(SD)		
Total study population	104	27.2	(29.1)	82	20.2	(28.6)	0.030	0.030
Bilateral hydrosalpinges	63	29.4	(31.5)	34	13.4	(23.4)	0.004	0.008
Ultrasound-visible hydrosalpinx	51	30.3	(29.4)	42	17.1	(30.4)	0.003	0.009
Bilateral and ultrasound-visible	33	34.2	(32.0)	19	10.5	(26.8)	0.001	0.004

Cycles after non-randomized surgery are excluded.

*n* denotes the number of included patients.

<sup>a</sup>104 patients in the salpingectomy group is the sum of 103 patients with salpingectomy before any transfer + one patient with salpingectomy after oocyte retrieval but before transfer.

From Strandell et al 2001



## ART öncesi hidrosalpenkslere yaklaşım ?

- Transvajinal iğne aspirasyonu
  - Aboulghar M, et al. Fertil Steril 1990;53:311–4.
  - Sowter MC, et al. Hum Reprod 1997;12:2147–50.
  - Van Voorhis BJ, et al. Hum Reprod 1998;13:736–9



# Asherman Sendromu







Cine 532

68



# İntrauterin sineşi





postop

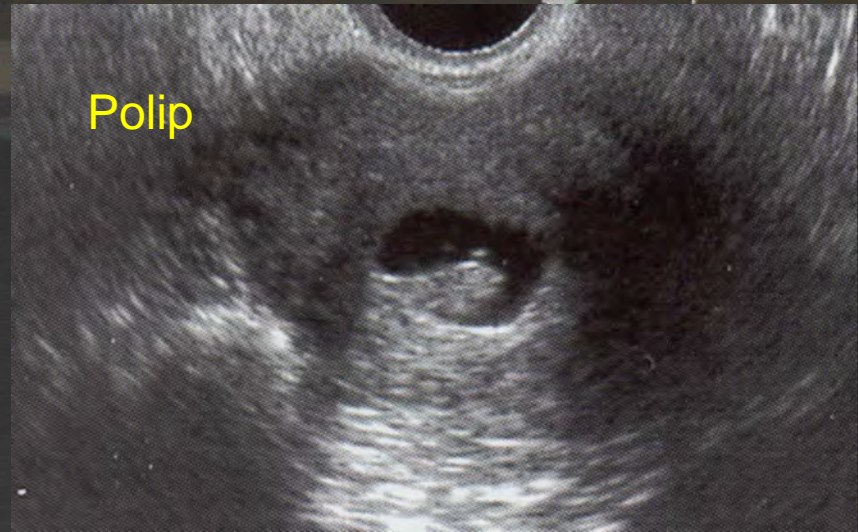
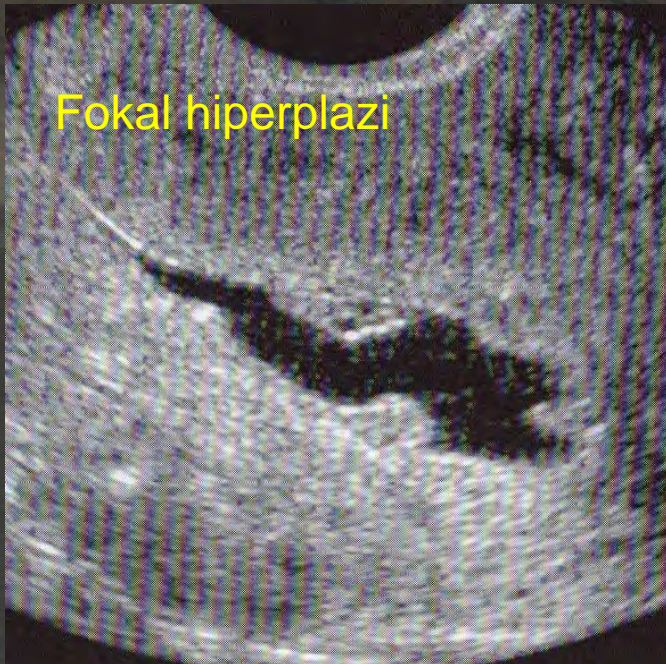


# Endometrial polipler – Ayırıcı tanı

## ✓ Fokal hiperplazi

*Genellikle endometrium sınırı görülmez*

*Küçük ve geniş tabanlı polipler ile çok karışır*



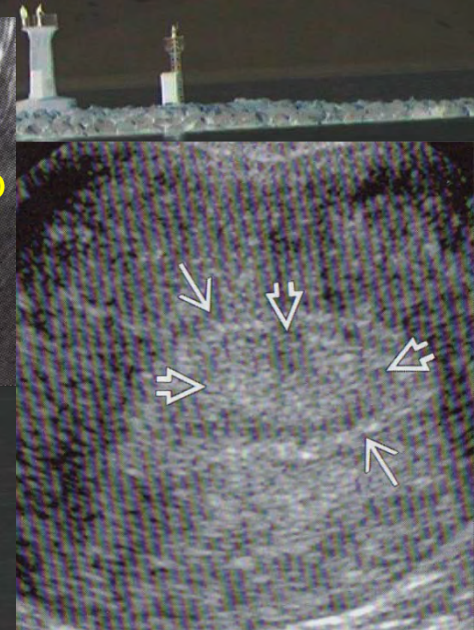
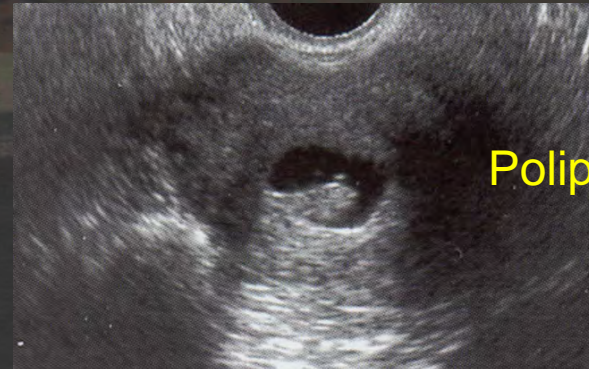
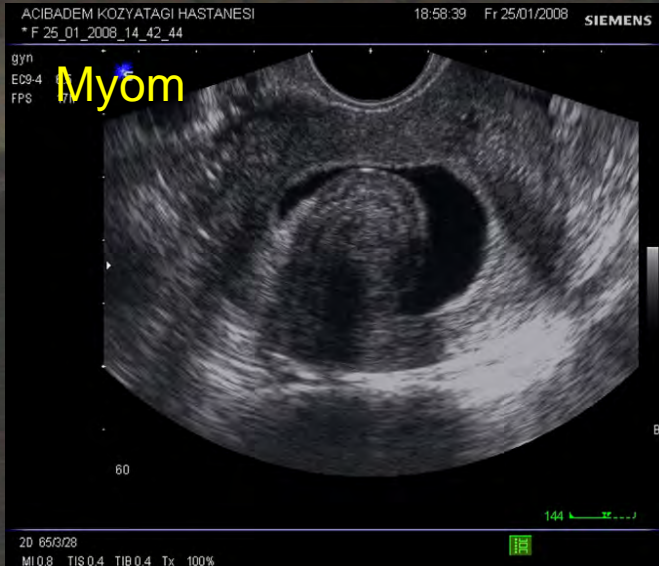


# Endometrial polipler – Ayırıcı tanı

- ✓ Submüköz myom

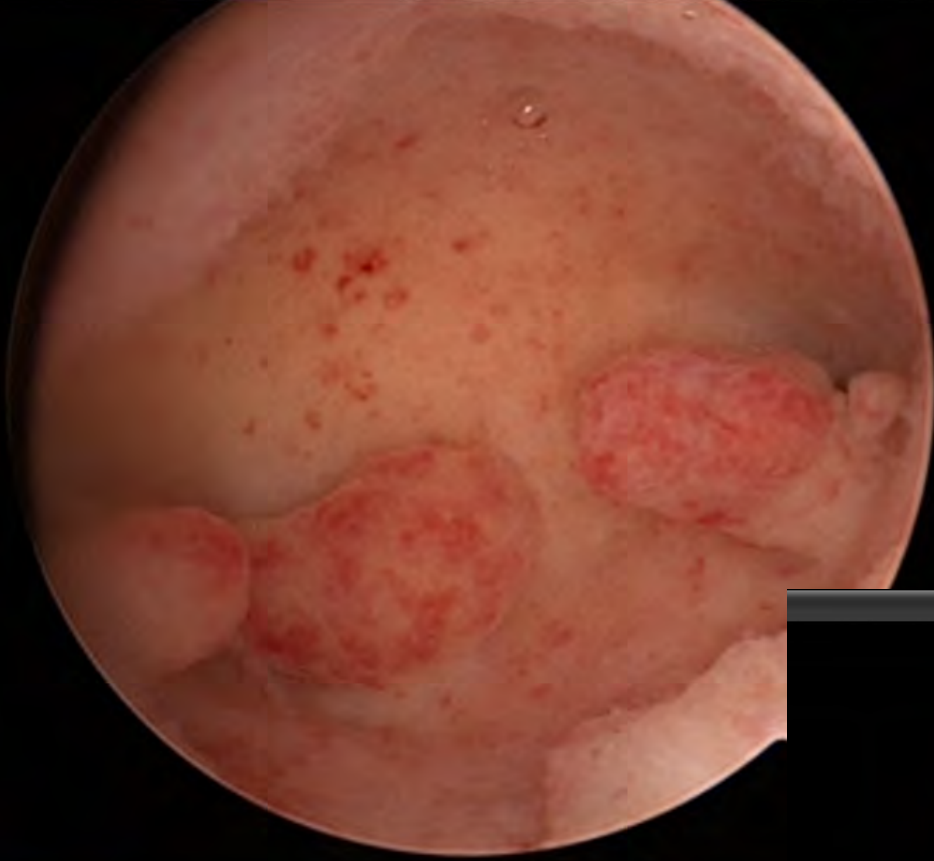
*Myom daha hipoekoiktir*

*Endometrium ekojenitesi kitlenin üzerindedir*









Video\_001.mpg [1/2]

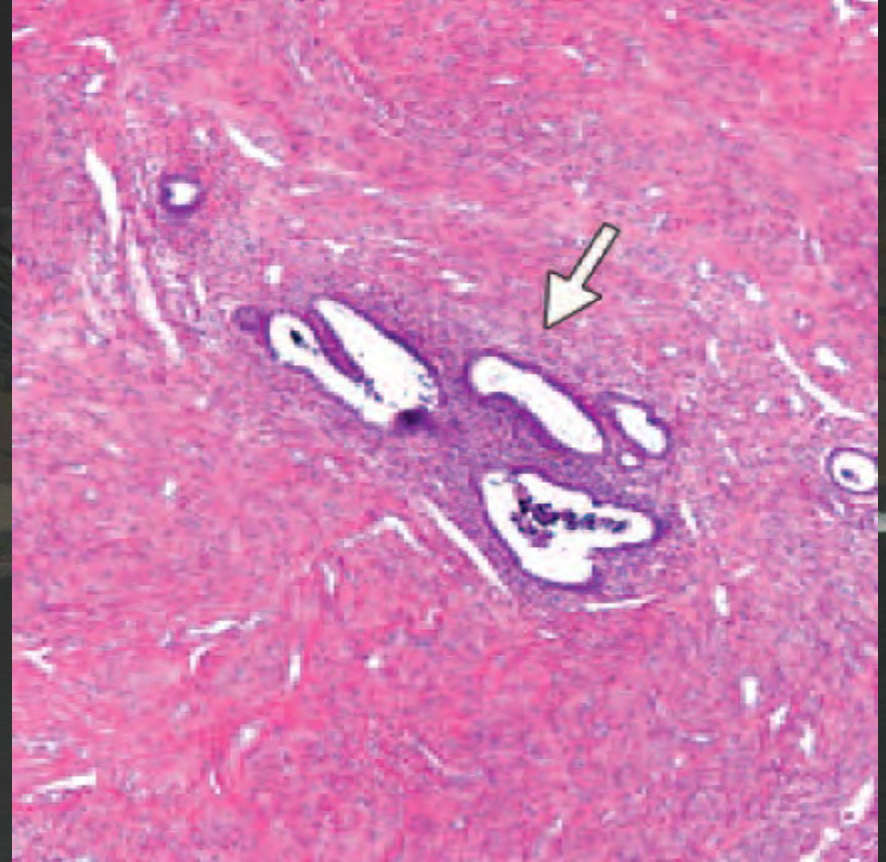






# Adenomyozis

- Endometriyal glandular ve stromal dokunun myometrium içerisinde görülmesi
- Komşu düz kas hipertrofisi





# Adenomyozis

## Epidemioloji

- Kadınların % 20.

(J Minim Invasive Gynecol 2009; 16:622–625)

- Endometriozisi olan kadınlarda daha sık.

- Düşük BMI olan kadınlarda daha sık.

(Hum Reprod 2010; 25:1325–1334)



# Adenomyozis

## Tanı - US

- Büyük uterus (myom yok)
- Endomyometrial bileşkenin zor tesbiti
- Myometrial kistler
- Değişken ekojenite
- Kitle görüntüsünün yokluğu
- Lezyon sınırlarının ayırt edilmesinde zorluk
- Penetran kan akımının izlenmesi (Doppler)

# Adenomyozis





16266-13-03-27-6

IC 5-9H/GYN

MI 0.7

ACIBADEM UREME SAGLIGI

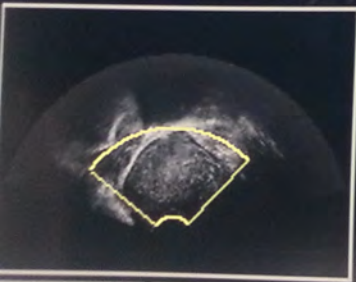
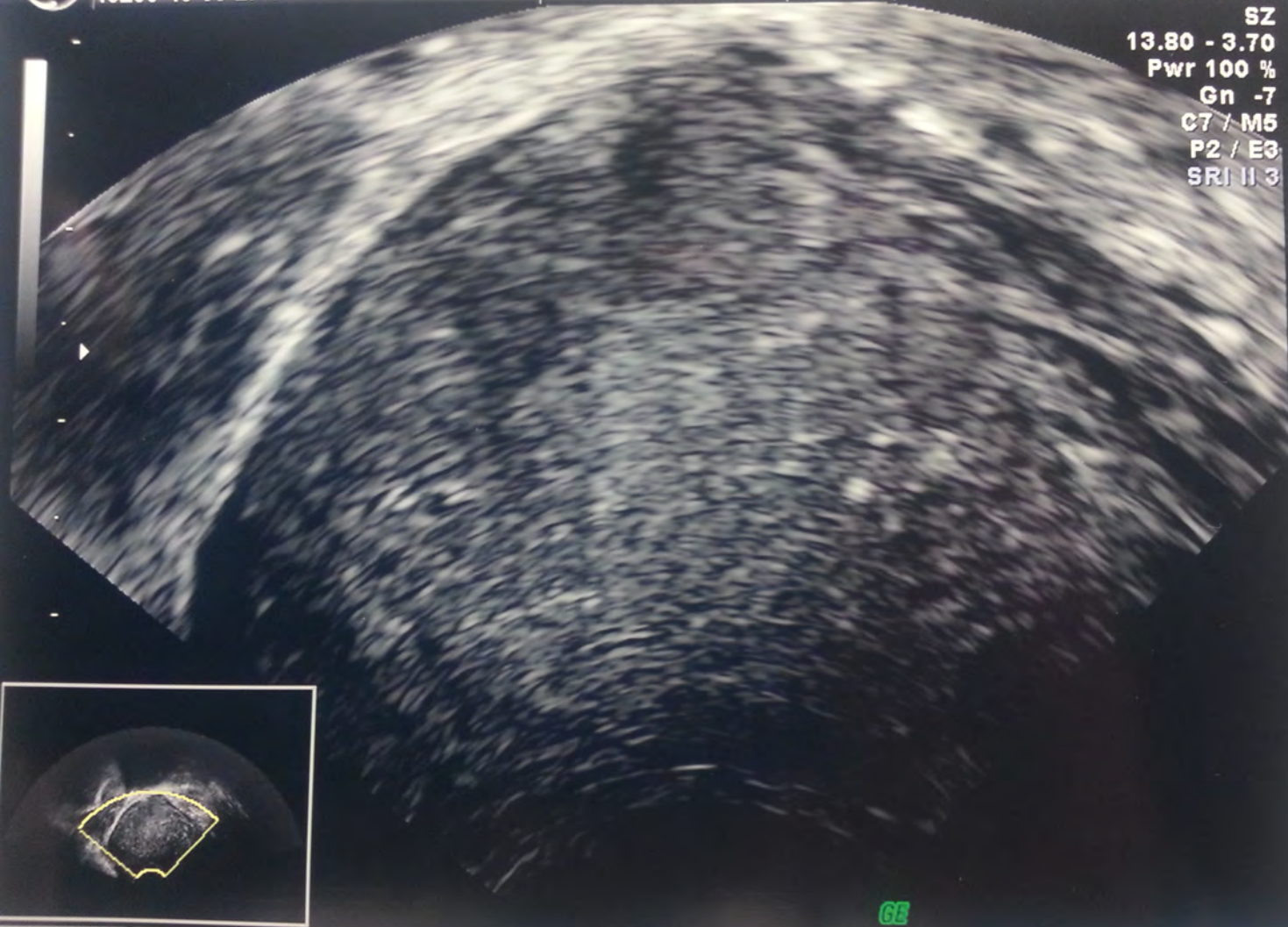
0.1/ 4.3cm / 55Hz

TIs 0.4

27.03.2013

15:19:25

SZ  
13.80 - 3.70  
Pwr 100 %  
Gn -7  
C7 / M5  
P2 / E3  
SRI II 3

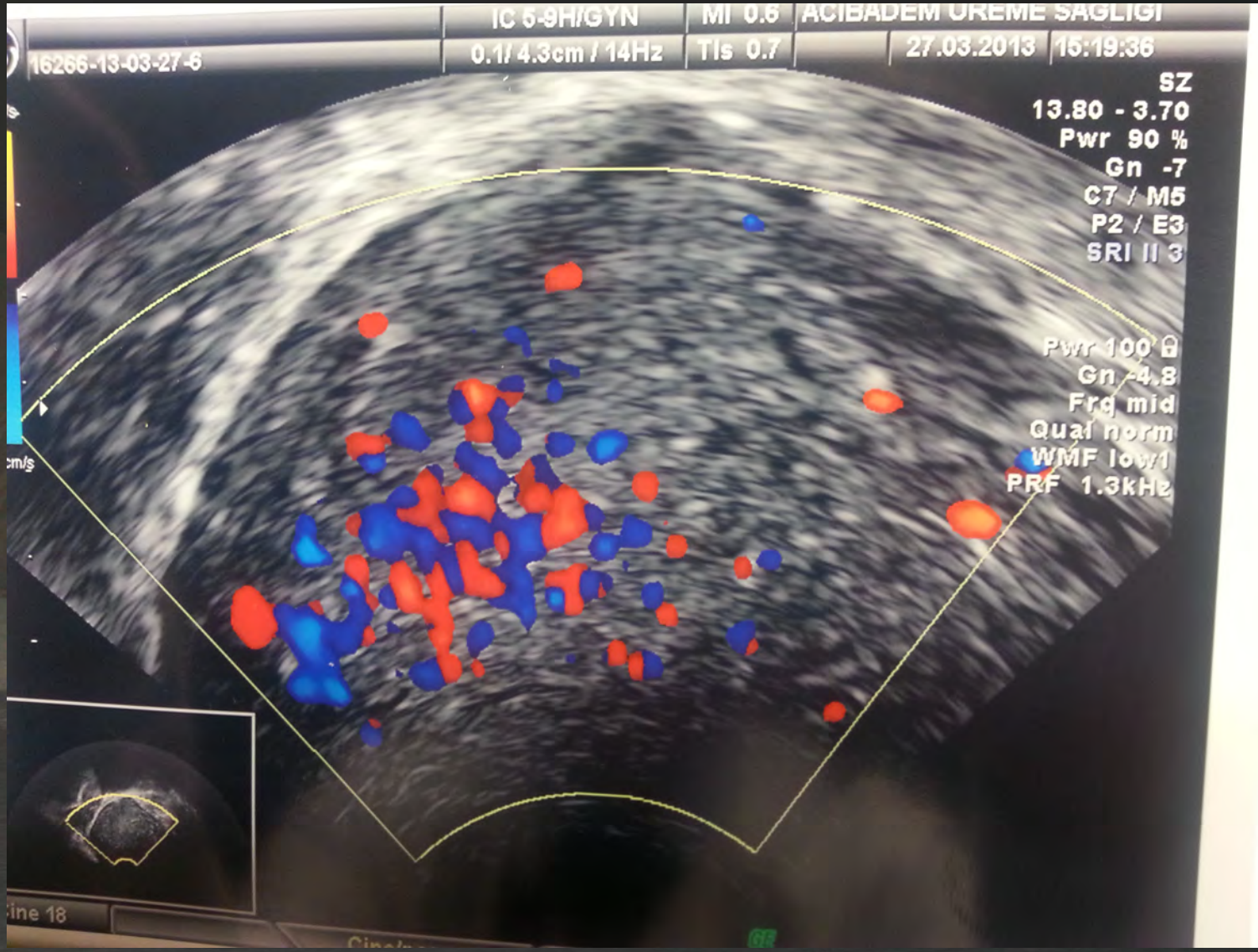


GE

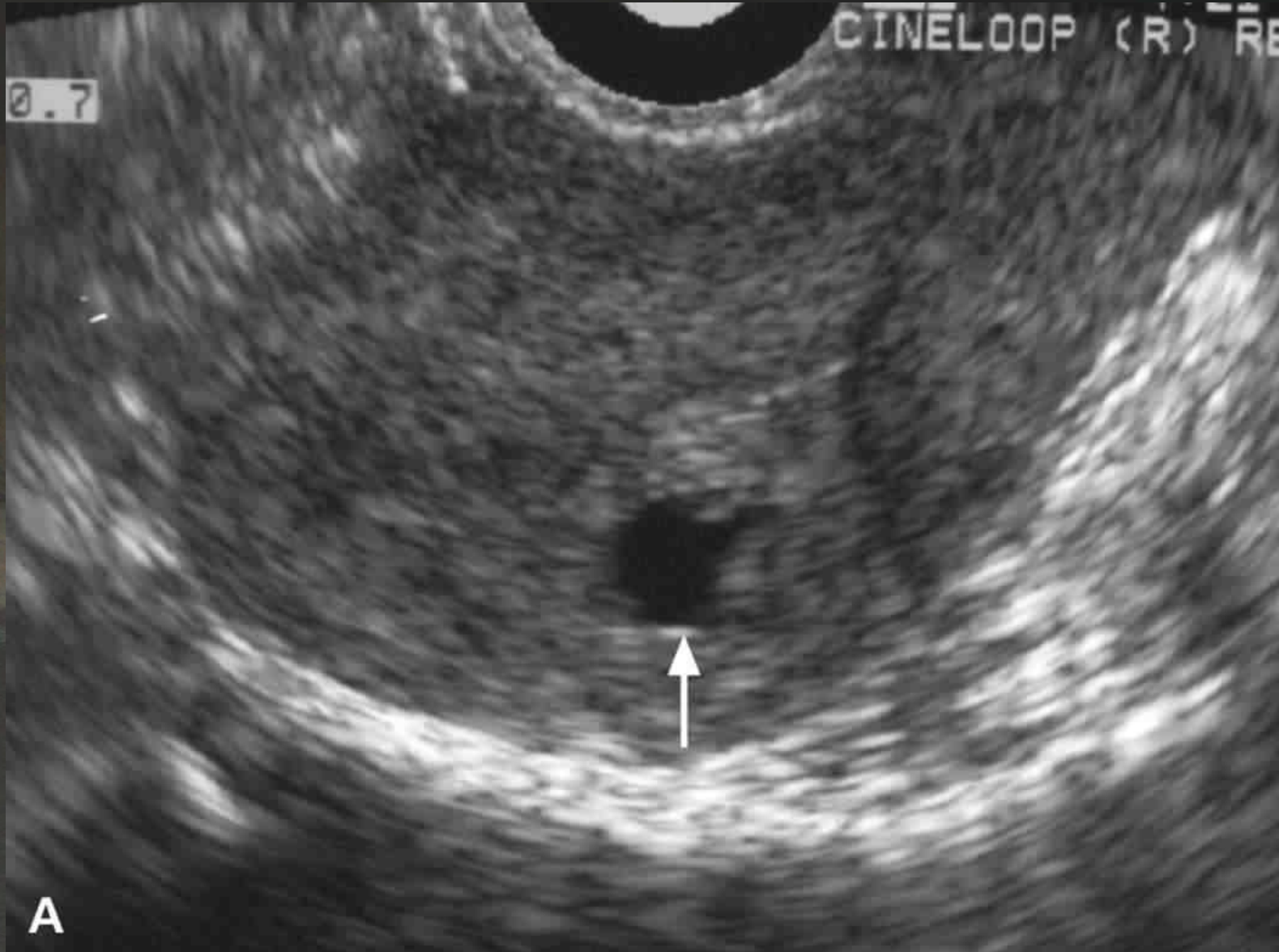
D-pos

Cine/pos

47 sec



# Adenomyozis



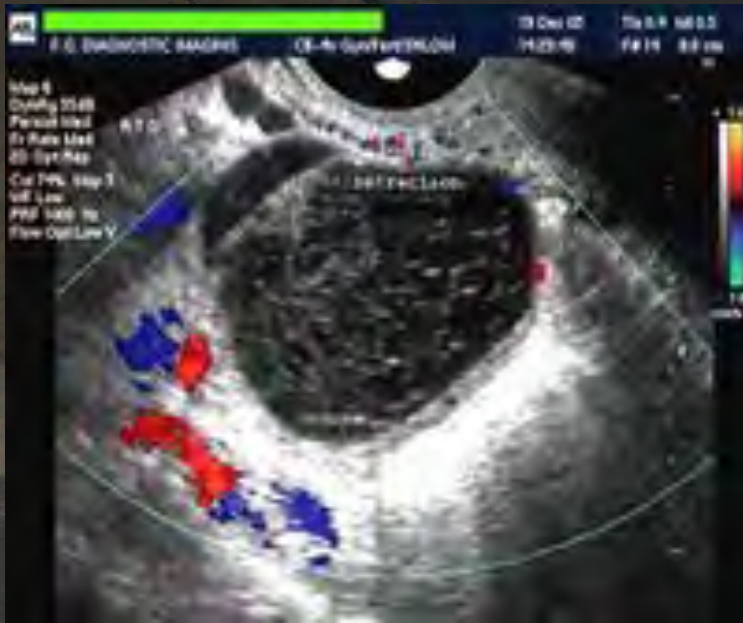


# Endometrioma vs Hemorajik Kist

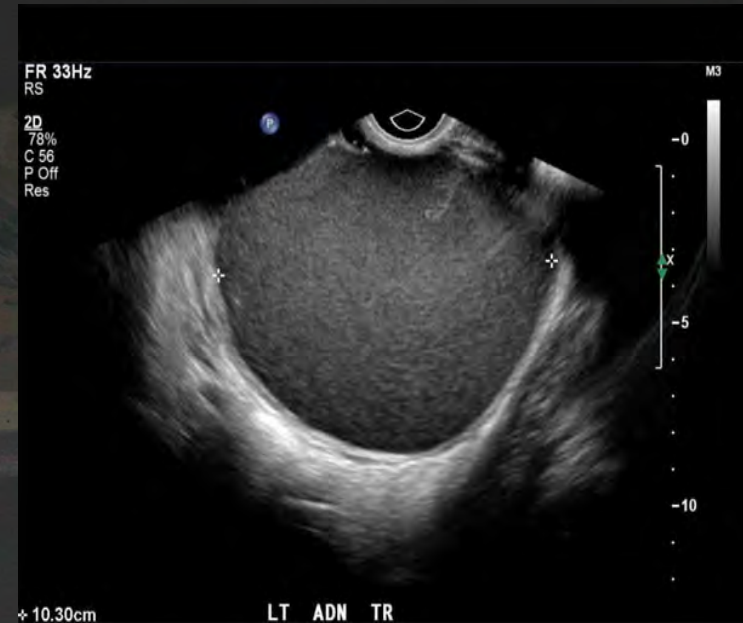
Hemorajik Kist

Kist

Endometrioma



Retraksiyon  
Organizasyon



Homojen Yoğunlaşma  
Diffüz düşük amp. eko



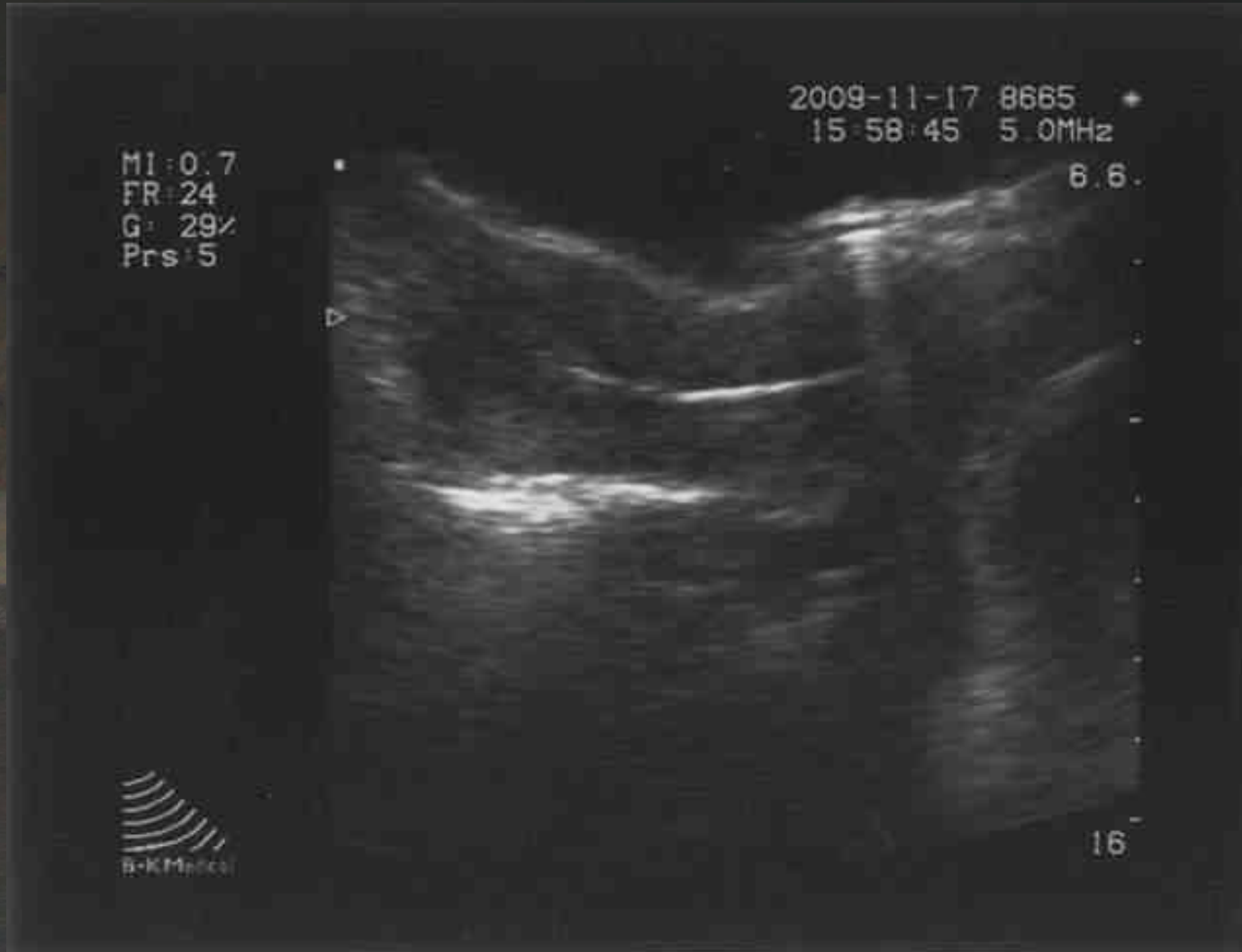


# İnvaziv İşlemlere Yardımcı Olarak Ultrasonografi





# Intrauterin İnseminasyonda



# Oosit Pick up



ACIBADEM BURSA IVF UNIT

08:51:25 Tu 26/03/2013

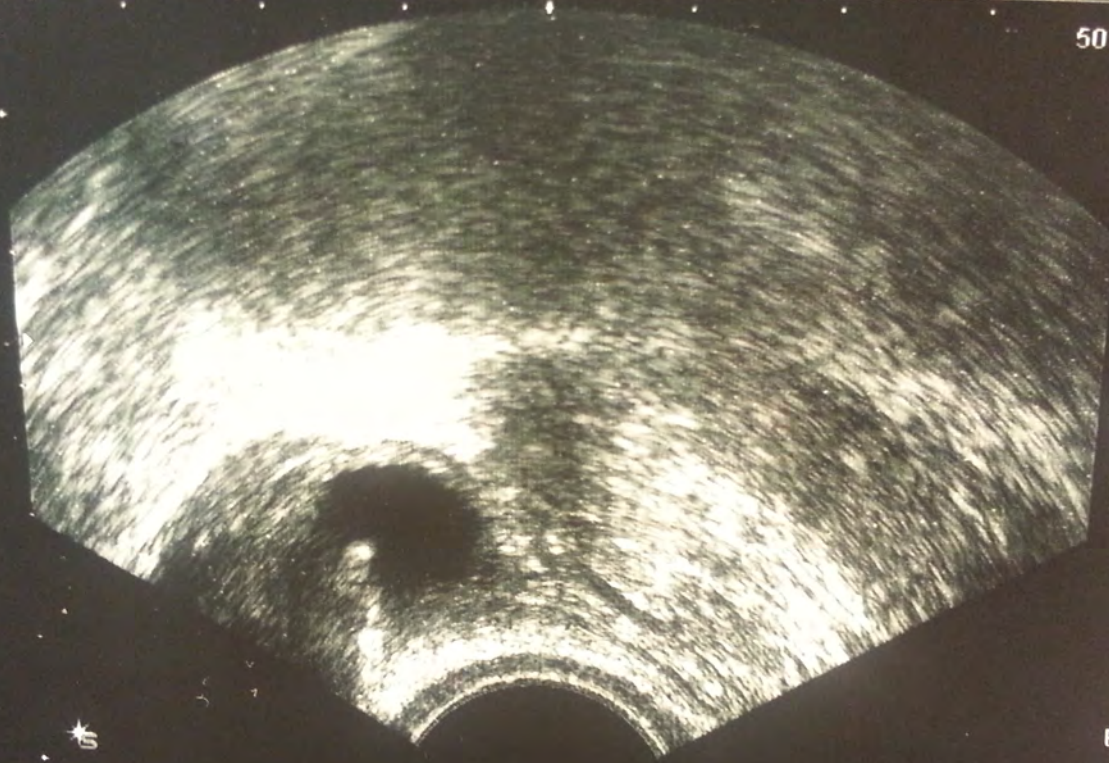
SIEMENS

SZ GYN

EC9-4 6.5

FPS 21h

50



2D 65/3/28

MI 0.8 TIS 0.4 TIB 0.4 Tx 0dB

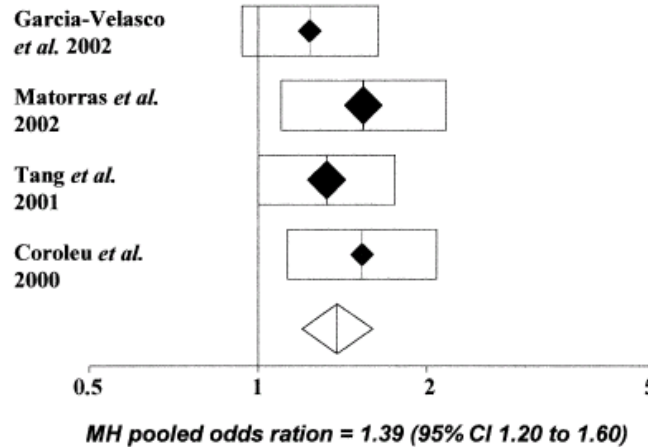




# Transfer

## 1. USG eşliğinde vs. clinical touch ET

Odds ratio for embryo implantation in all prospective randomized controlled trials of ultrasound-guided embryo transfer.



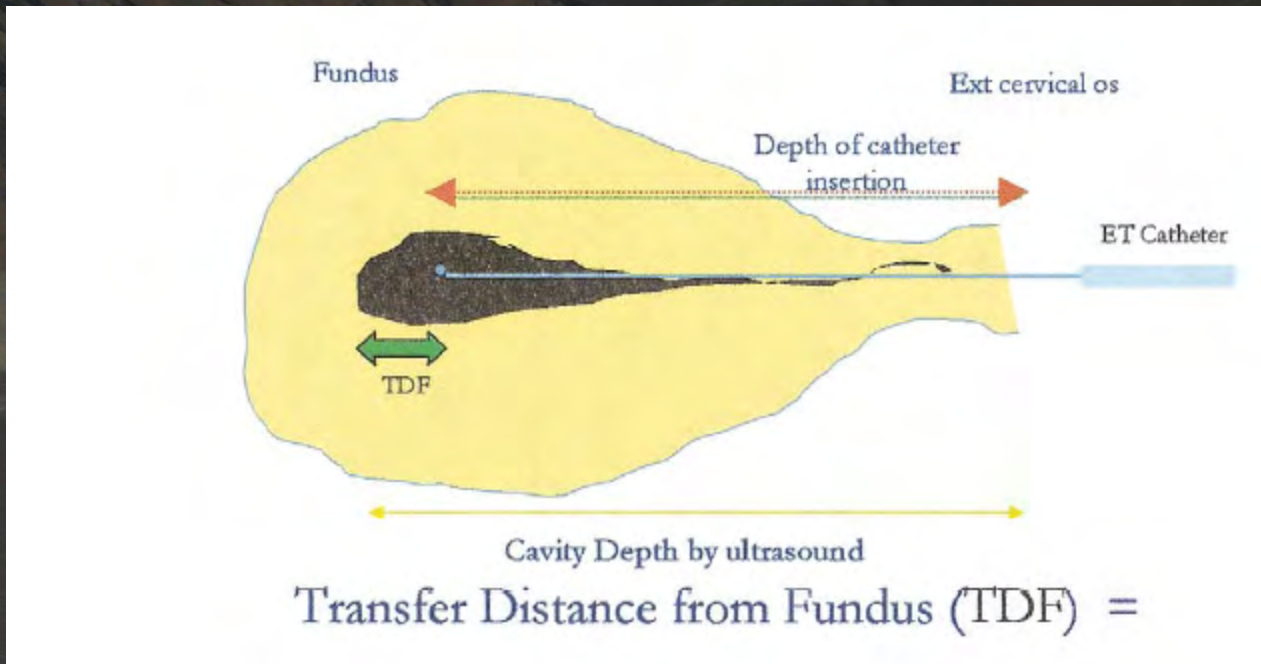
Buckett. Meta-analysis of ultrasound-guided ET. Fertil Steril 2003.

USG eşliğinde ET, klinik PR ve IR' de artış sağlar

(Buckett 2003 ,meta-analysis)

# Transfer

## 2. Embryoların bırakılma noktası:





ACIBADEM BURSA IVF UNIT

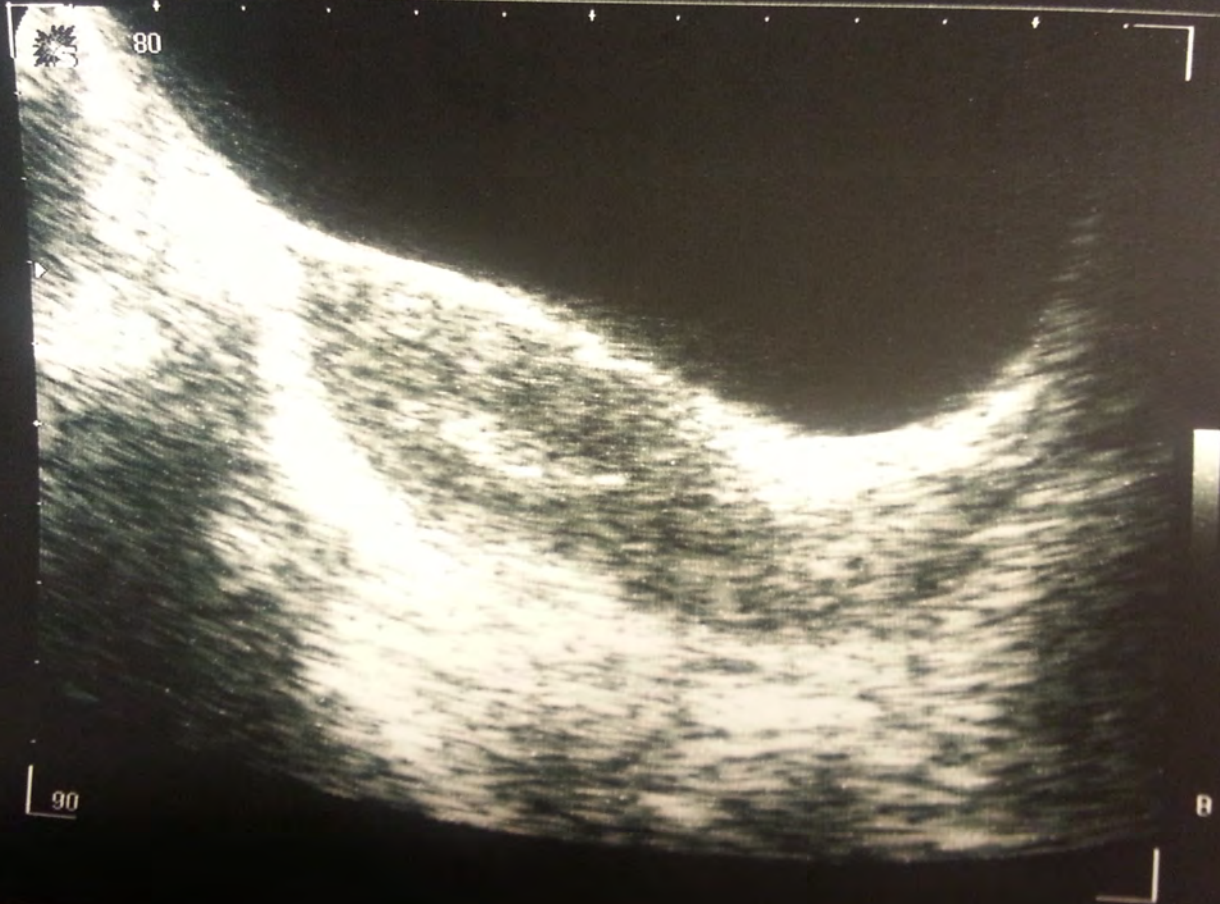
09:38:41 Tu 26/03/2013

SIEMENS

SZ ET

CG-2 3.5

FPS 12h



20 60/2/ 0

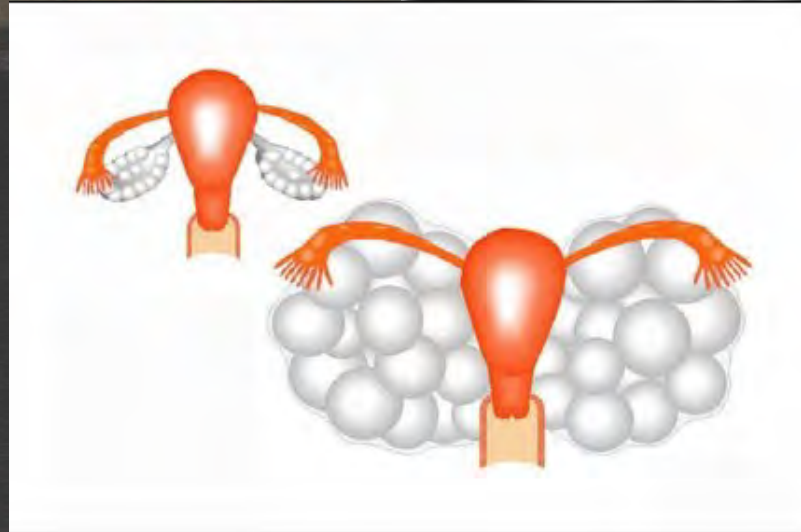
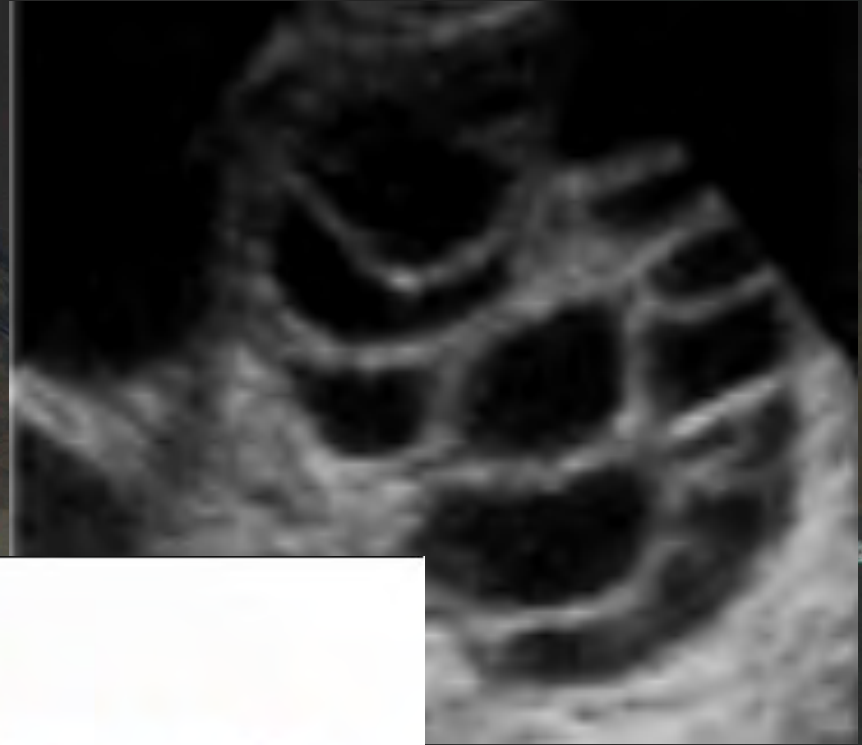
M108 T13.0.6 T13.0.6

177



## OHSS (Yumurtalıkların aşırı uyarılması sendromu)

- Overlerde büyüme
- Batında asit
- Hemokonsantrasyon
- İdrar azalması – böbrek yetmezliği
- Solunum sıkıntısı
- Tromboz



ACIBADEM BURSA IVF UNIT

16:01:13 Tu 26/03/2013

SIEMENS

SZ GYN

EC9.4 6.5

FPS 21h



# OHSS' de Asit Drenaji



ACIBADEM BURSA IVF UNIT

16:32:28 Tu 26/03/2013

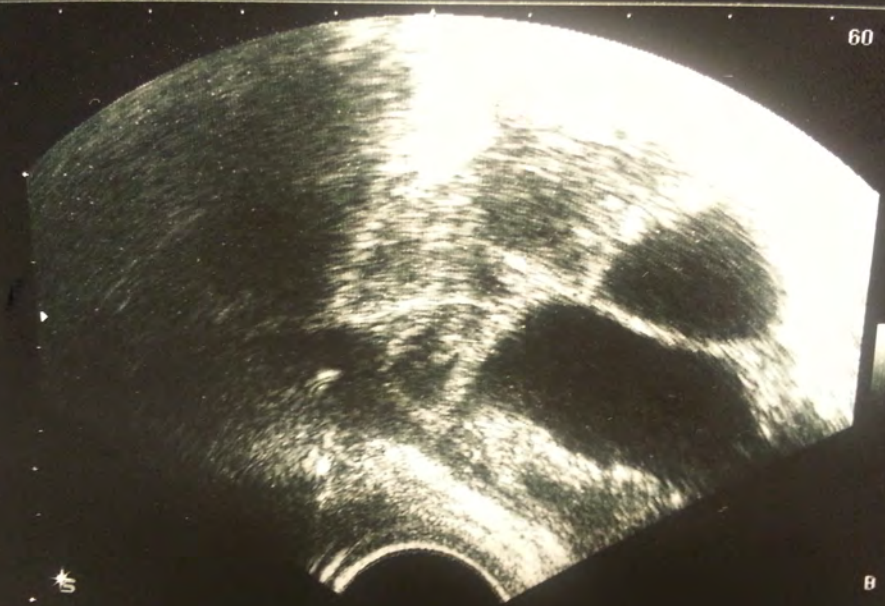
SIEMENS

SZ GYN

EC9.4 6.5

FPS 21h

60



2D 65/3/20

MI 0.8 TIS 0.4 TIB 0.4 Tx 0dB

2D 65/3/33

MI 0.8 TIS 0.4 TIB 0.4 Tx 0dB





**Teşekkürler...**