

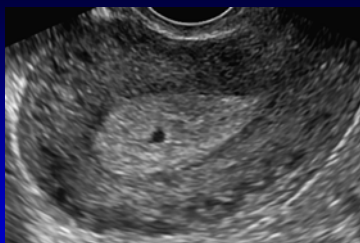
U/S of the Early 1st Trimester

Diagnostic Considerations

- ❖ Diagnosis of early IUP (prior to visualization of yolk sac or embryo)
- ❖ Intrauterine pregnancy of uncertain viability
 - Diagnosis of pregnancy failure ("miscarriage")
- ❖ Pregnancy of unknown location
 - Role of quantitative hCG
- ❖ Diagnosis of ectopic pregnancy
 - Tubal
 - Other (unusual) locations

Mistakes to Avoid in the 1st Δ

Misdiagnosis of an Early Intrauterine Pregnancy as an Ectopic Pregnancy



Diagnosis of Early IUP

Prior to Visualization of Yolk Sac or Embryo

First, Do No Harm . . . to Early Pregnancies
Peter M. Doubilet, MD, PhD
 Carol B. Benson, MD

Medical Liability in Ob and Gyn
Waiting for the Tide to Change
Reducing Risk in the Turbulent Sea of Liability
James M. Shewdyer, MD, JD

GENERAL GYNECOLOGY
Outcome following high-dose methotrexate in pregnancies misdiagnosed as ectopic

JUM 2010 Editorial

OB-Gyn 2010

AJOG 2011


"A rapidly increasing source of medical liability actions relates to the unintended treatment of an IUP with methotrexate, misdiagnosed as an ectopic pregnancy"

Misdiagnosis of Early IUP as Ectopic Pregnancy Leading to Adverse Outcome

Not an Uncommon Event

- ❖ Facebook group: "Misdiagnosed Ectopic, Given Methotrexate"
 - www.facebook.com/groups/misdiagnosedectopic
 - 121 members as of 7/26/13
- ❖ Support group: "Misdiagnosed Ectopic Pregnancy and Abortion Drug Given"
 - <http://miscarriage.supportgroups.com/sq/miscarriage/misdiagnosed-ectopic-pregnancy-and>
 - 235 members as of 8/18/2012

Sonographic Signs of Early Intrauterine Pregnancy



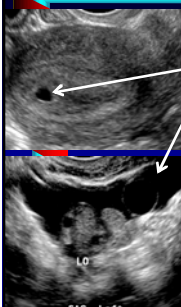
Double sac sign

Intradecidual sign

No sign ("Nonspecific" saclike fluid collection)

Misdiagnosis of Early Intrauterine Pregnancy

Example



5 week scan for pelvic pain, read as:

Findings: 4x3 mm fluid space in uterus, 1.3 cm cyst adjacent to left ovary. Small amount of free fluid.

Impression: Left ectopic pregnancy, with pseudogestational sac in uterus

Treated with systemic MTX

Repeat scan 4 days later: IUP with yolk sac

Outcome: Failed pregnancy

Follow-up: Malpractice lawsuit

⊕ hCG & Non-Specific Saclike Intrauterine Fluid Collection

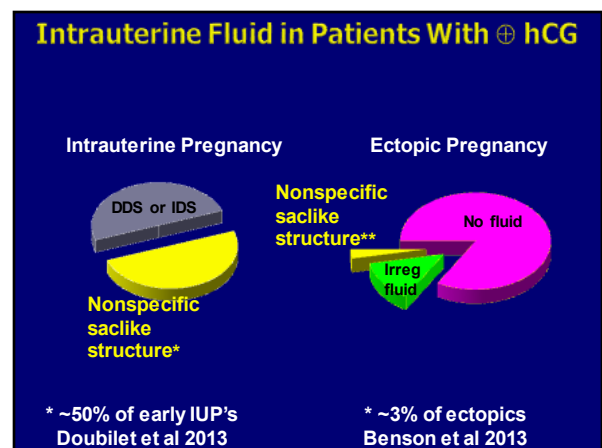
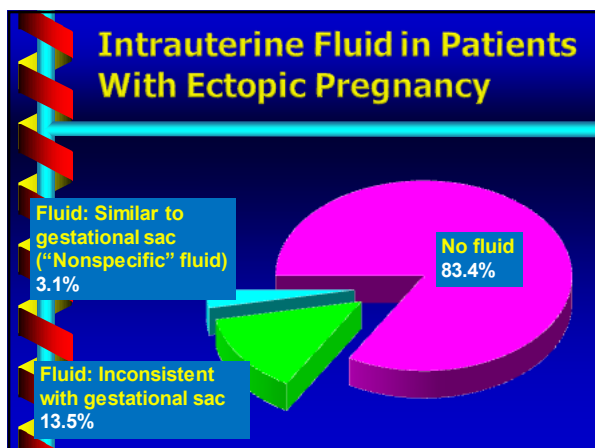
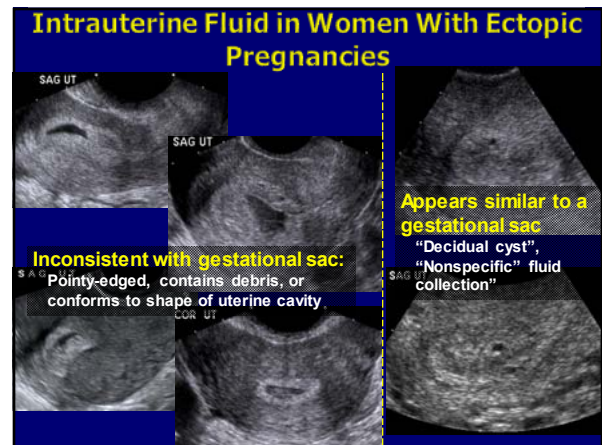
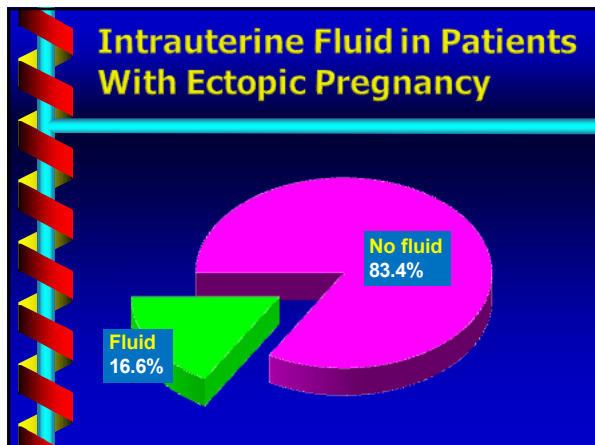
How Often is it an Intrauterine Pregnancy?

- ❖ How often does an intrauterine gestational sac have a DSS or IDS (& what is the interobserver agreement)?
 - Doubilet, Benson. Double sac sign and intradecidual sign in early pregnancy. J Ultrasound Med 2013; 32: 1207-1214
- ❖ In a patient with ectopic pregnancy, how often is there intrauterine fluid and what is its sonographic appearance?
 - Benson, Doubilet, Peters, Frates. Intrauterine fluid in ectopic pregnancy: a reappraisal. J Ultrasound Med 2013; 32: 389-393

DSS & IDS in Early IUP

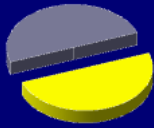
Results: Presence of DSS & IDS

- ❖ Neither sign is present ("non-specific" sac-like fluid collection) in ~50% of early IUPs
- ❖ Poor inter-observer agreement for presence of DSS & IDS

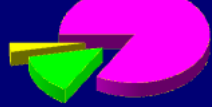


Intrauterine Fluid in Patients With \oplus hCG

Intrauterine Pregnancy (98%)



Ectopic Pregnancy (2%)



= nonspecific saclike structure

Saclike Intrauterine Fluid Collection

Gestational Sac vs.
Pseudogestational Sac/Decidual Cyst

Incidence of ectopics in all pregnancies = 2%

50% of early IUP's appear as a "nonspecific" saclike fluid collection

3% of ectopics have a "nonspecific" saclike fluid collection



An isolated saclike fluid collection in a woman with a \oplus hCG has a:

>99% chance of being a gestational sac

<1% chance of being a pseudogestational sac/decidual cyst

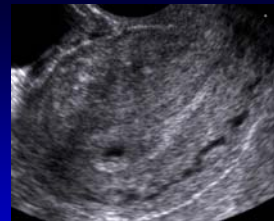
Nonspecific Fluid Collection

Gestational Sac vs.
Pseudogestational Sac/Decidual Cyst

In a woman with a positive hCG and an isolated nonspecific saclike intrauterine fluid collection (no DSS, IDS, yolk sac, or embryo), the fluid collection is:

**almost certain to be a gestational sac
&
very unlikely to be a
pseudogestational sac/decidual cyst**

"Nonspecific" Saclike Intrauterine Fluid Collection in Early Pregnancy Correct Interpretation



✓ "There is an intrauterine fluid collection that is highly likely to represent a gestational sac. Ectopic pregnancy is far less likely."

Diagnosis of Early Intrauterine Pregnancy

Take-Away Message



- ❖ In a patient with a positive hCG and no adnexal mass suggestive of ectopic pregnancy, **any fluid collection** with rounded edges in the central echogenic portion of the uterus must be considered to be a **probable gestational sac**
- Correct interpretation: "There is an intrauterine fluid collection that is highly likely to represent a gestational sac. Ectopic pregnancy is far less likely."
- Treatments that can damage an intrauterine embryo (MTX, D&C) should be avoided until IUP is definitively excluded

Mistakes to Avoid in the 1st Δ

*Misuse of hCG "Discriminatory Level" in a Woman with PUL**

~~"The hCG is above the discriminatory level, so there can't be a viable IUP; the patient should be treated for ectopic pregnancy"~~

~~"The hCG is below the discriminatory level (or <1000 mIU/ml), so there can't be a life-threatening (ruptured) ectopic pregnancy?"~~

* PUL = \oplus hCG and no IUP or ectopic seen on TV/U/S

hCG "Discriminatory Level"

- ❖ Concept Originated by Kadar in 1981
- ❖ Definition
 - hCG level at which normal IUP is consistently seen
- ❖ Improved U/S Technology → ↓ Discrim Level
 - 1981: 6500 mIU/ml
 - 1985: 3600 mIU/ml
 - 1990 & beyond (TV U/S): 1000-2000 mIU/ml

hCG "Discriminatory Level" Rationale

hCG > 2000 mIU/ml & U/S: No intrauterine fluid collection

Can't have viable IUP

DDx: Failed IUP Ectopic

hCG "Discriminatory Level" Proposed Management Algorithms

hCG > discriminatory level & no IUP seen

↓

D&C

↓

Treat for ectopic pregnancy if no chorionic villi

hCG > discriminatory level & no IUP seen

↓

IM MTX for presumed ectopic pregnancy

hCG "Discriminatory Level" Reality

1 month later

hCG = 4336 mIU/ml
No visible gestational sac

Normal 9½ week IUP

↓

Normal term baby

hCG "Discriminatory Level" Reality

6 days later

hCG = 2217 mIU/ml
No visible gestational sac

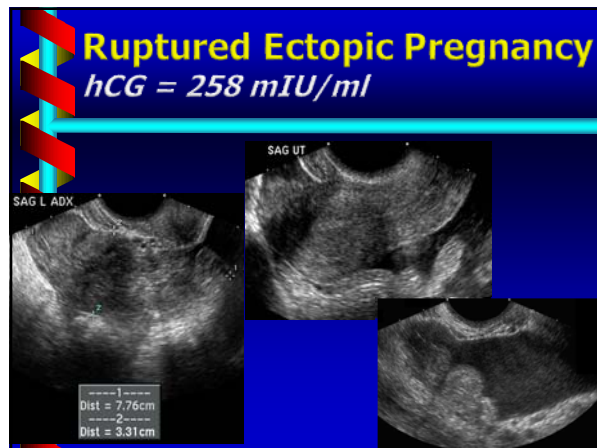
Normal 5½ week twin IUP

↓


Normal term twins

hCG > 2000 mIU/ml & No Intrauterine Fluid Collection → ⊕ FH on F/U U/S BWH Experience 1/1/2000 – 12/31/2010

hCG at 1st U/S	# of ⊕ FH's on F/U U/S	Pregnancy Outcome
2215	1	1 normal liveborn
2217	2	2 normal liveborns
2374	1	1 normal liveborn
2530	1	Demise at 21 weeks
2539	1	1 normal liveborn
2993	1	1 normal liveborn
4336	1	1 normal liveborn
4476	1	Demise at 8 weeks
6567	1	Demise at 8 weeks



hCG ↔ Pregnancy of Unknown Location (PUL)



- ❖ hCG levels in viable IUPs, nonviable IUPs, and ectopic pregnancies have considerable overlap
- ❖ If $hCG < 3000 \text{ mIU/ml}$:
 - treatment for possible ectopic pregnancy (MTX, D&C) should not be undertaken, to avoid risk of interrupting viable IUP
- ❖ If $hCG \geq 3000 \text{ mIU/ml}$:
 - viable IUP is possible but unlikely
 - most likely diagnosis is failed IUP, so it is generally appropriate to get at least one follow-up hCG before treating for ectopic pregnancy

Mistakes to Avoid in the 1st Δ Diagnosis of Early Pregnancy Failure ("Miscarriage")

~~Diagnose definite miscarriage when there is a chance (even a small chance) of a viable IUP~~

~~Recommend a follow-up scan when there is no chance of an ongoing pregnancy~~

Intrauterine Pregnancy of Uncertain Viability: Criteria for Pregnancy Failure

Parameter	Definitely Nonviable	Suspicious for Nonviability
CRL	$\geq 7 \text{ mm}$ and no heartbeat	$< 7 \text{ mm}$ and no heartbeat
MSD	$\geq 25 \text{ mm}$ and no embryo	16-24 mm and no embryo
Time	-	No embryo ≥ 6 weeks after LMP
	Absence of embryo ≥ 2 weeks after a scan that showed a gestational sac without yolk sac	Absence of embryo 7-13 days after a scan that showed a gestational sac without yolk sac
	Absence of embryo ≥ 11 days after a scan that showed a gestational sac with yolk sac	Absence of embryo 7-10 days after a scan that showed a gestational sac with yolk sac
Other		Empty amnion
		Enlarged yolk sac ($> 7 \text{ mm}$)
		Small gestational sac in relation to embryo (MSD-CRL $< 5 \text{ mm}$)

Mistakes to Avoid in the 1st Δ Confusion between Intraovarian Mass & Extraovarian Mass in a Patient with $\oplus \beta\text{-HCG}$

~~Mass within an ovary (corpus luteum) may be mistaken for extraovarian mass, leading to false positive diagnosis of ectopic pregnancy~~

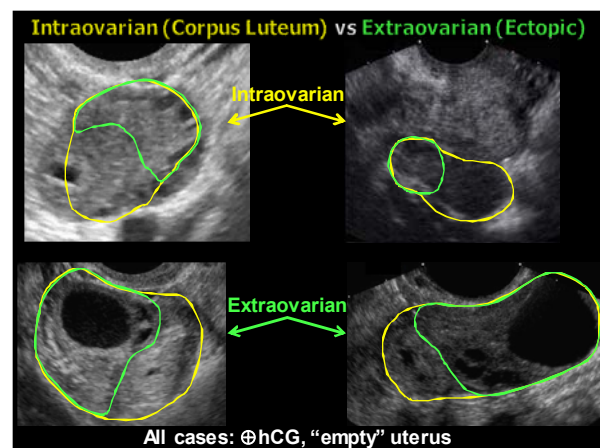
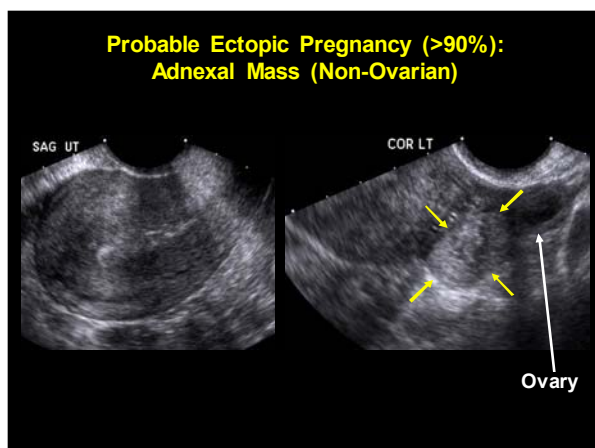
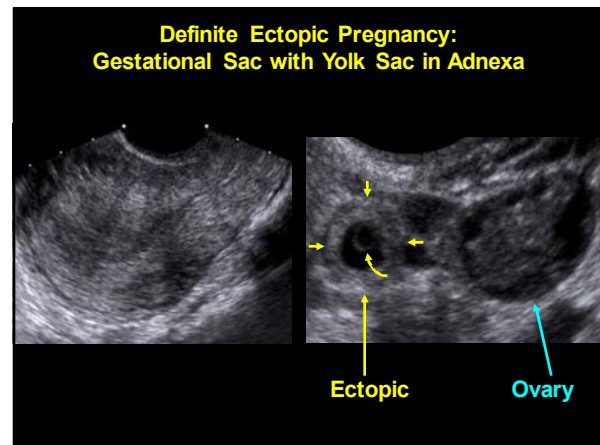
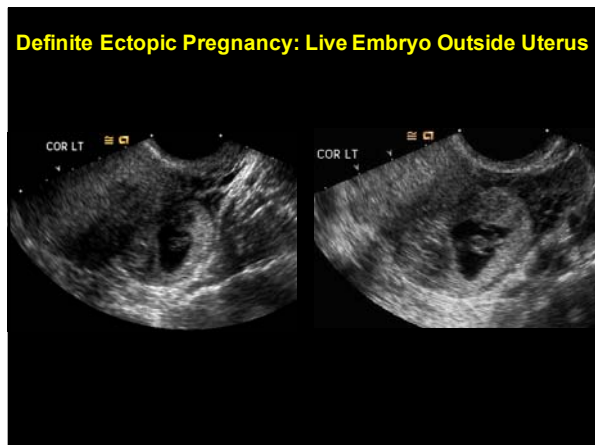
~~Mass adjacent to an ovary may be mistaken for an intraovarian mass (corpus luteum), leading to failure to diagnose ectopic pregnancy~~

Ectopic Pregnancy Sonographic Diagnosis

- ❖ **Clinical Setting**
 - Positive hCG & symptoms (pain or bleeding) ("Rule-out-ectopic" patient)
- ❖ **Key Questions**
 - Does the sonogram demonstrate an intrauterine gestational sac?
 - Is there an extraovarian adnexal mass?

Patient with \oplus hCG, Symptoms, & No Intrauterine Gestational Sac		
Extraovarian Adnexal Findings		Likelihood of Ectopic
Abnormal		
Mass with embryo or yolk sac		100%
Lesion surrounded by tubal ring		95%
Other complex or solid mass		92%
Free fluid (isolated, \geq moderate)		(high)
Normal (\pm ovarian lesion)		5%

"R/O Ectopic" Patient: \oplus hCG & Sx's Basic Rules for U/S Diagnosis		
U/S Finding	Interpretation	
Adnexal mass with heartbeat or yolk sac	Definite ectopic	
Extraovarian mass without heartbeat or yolk sac	Probable ectopic	
Moderate-large amount of free fluid in pelvis	Probable ectopic	
Normal scan (\pm intraovarian cyst or mass)	Possible (but unlikely) ectopic* ["Can't R/O ectopic"]	
Intrauterine pregnancy	Ectopic virtually excluded (but check adnexa for extraovarian mass)	



Mistakes to Avoid in the 1st Δ

Reliance on Doppler to Diagnose or Exclude Ectopic Pregnancy

- ❖ Prominent color Doppler flow around a corpus luteum may lead to false positive diagnosis of ectopic pregnancy
- ❖ Absence of Doppler signals from within an extraovarian mass may lead to failure to diagnose ectopic pregnancy

Ectopic Pregnancy

Rationale for Doppler

❖ Doppler Around a Gestational Sac

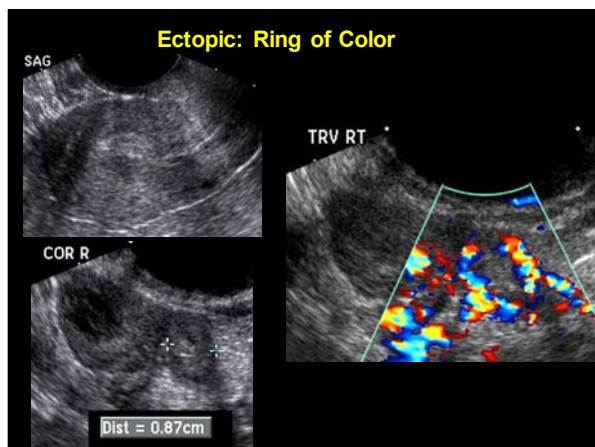
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High-Volume, Low-Impedance Flow from Trophoblastic Tissue

- Color: prominent ring of color
- Spectral: high flow through diastole

In uterus → Suggests IUP

In adnexa → Separate from ovary → Suggests ectopic



1st Trimester Bleeding or Pain

Limitation of Doppler ↔ Ectopic

- ❖ Presence of Low-Impedance Flow in an Adnexal Mass Does not Definitively Diagnose Ectopic Pregnancy, as Similar Flow Can Be Seen With:
 - Tubo-ovarian abscess
 - Corpus luteum cyst
- ❖ Absence of Low-Impedance Flow in an Adnexal Mass Does not Definitively Exclude Ectopic Pregnancy, as the Mass May Represent a Hematoma

Can Doppler Help in These Women With Sx's, ⊕hCG, & No IUP?

Gray-Scale Finding/ Likelihood of Ectopic	Gestational sac with heartbeat 100%	Mass ("tubal ring") ~ 95%	Normal ~ 5%
Can Doppler Help?	No	No	No

