

**First Trimester Bleeding  
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
1. Bree RL, Edwards M, Bohm-Velez M, Beyler S, Roberts J, Mendelson EB. Transvaginal sonography in the evaluation of normal early pregnancy: correlation with HCG level. <i>AJR</i> 1989; 153(1):75-79.	9	53 patients 75 TVS examinations	Compare transvaginal sonography (TVS) with beta human chorionic gonadotropin ( $\beta$ -hCG) level in the evaluation of embryo in early pregnancy.	<ul style="list-style-type: none"> <li>• <math>\beta</math>-hCG level of 1000 mIU/ml - gestational sac was seen sonographically in each patient.</li> <li>• <math>\beta</math>-hCG level of 7200 mIU/ml - yolk sac was seen in every patient.</li> <li>• 10/22 patients with <math>\beta</math>-hCG between 1000 and 7200 mIU/ml had a visible yolk sac.</li> <li>• Every patient with <math>\beta</math>-hCG level &gt;10,800 mIU/ml had a visible embryo with a heartbeat.</li> <li>• Results support other studies that TVS can define pregnancy as early as 32 days and at <math>\beta</math>-hCG levels as low as 1000 mIU/ml.</li> </ul>	3
2. Bradley WG, Fiske CE, Filly RA. The double sac sign of early intrauterine pregnancy: use in exclusion of ectopic pregnancy. <i>Radiology</i> 1982; 143(1):223-226.	13	50 suspected ectopic pregnancy patients 17 proved ectopic cases	Retrospective review of pelvic sonograms to determine the usefulness of double sac sign in differentiating ectopic pregnancy from early intrauterine pregnancy (IUP).	Double sac appearance is a useful indicator for differentiating an ectopic pregnancy from an early normal IUP.	3
3. Parvey HR, Dubinsky TJ, Johnston DA, Maklad NF. The chorionic rim and low-impedance intrauterine arterial flow in the diagnosis of early intrauterine pregnancy: evaluation of efficacy. <i>AJR</i> 1996; 167(6):1479-1485.	10	169 with early IUP 69 with ectopic	Review sonograms to determine whether sonographic imaging of an intrauterine chorionic rim or arterial flow can help diagnose an early IUP.	126/238 patients had Doppler examination. Chorionic rim and double decidual sac had sensitivities of 80% and 64%, respectively, and specificities of 97% and 100%, respectively. Intrauterine arterial flow with either peak systolic velocity $\geq 15$ cm/sec or resistive index $\leq 0.55$ had a sensitivity of 70% and a specificity of 95%.	2
4. Laing FC, Brown DL, Price JF, Teeger S, Wong ML. Intradecidual sign: is it effective in diagnosis of an early intrauterine pregnancy? <i>Radiology</i> 1997; 204(3):655-660.	10	102 patients 4 observers	Retrospective study to determine if the intradecidual sign at sonography is effective in the diagnosis of early IUP.	Sensitivity for diagnosis of an IUP was 34%-66%, specificity was 55%-73%, accuracy was 38%-65%, PPV was 91%-93%, and NPV was 12%-16%.	2
5. Yeh HC, Goodman JD, Carr L, Rabinowitz JG. Intradecidual sign: a US criterion of early intrauterine pregnancy. <i>Radiology</i> 1986; 161(2):463-467.	10	36 patients with IUP 5 patients with ectopic	To determine the accuracy of the intradecidual sign (a feature on sonograms) in the detection of early IUP.	Intradecidual sign was more sensitive (91.7% vs. 63.9%) and specific (100% vs. 60%) than the double decidual sac sign in the detection of early IUP.	3

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6. Chiang G, Levine D, Swire M, McNamara A, Mehta T. The intradecidual sign: is it reliable for diagnosis of early intrauterine pregnancy? <i>AJR</i> 2004; 183(3):725-731.	10	153 patients with IUP 34 patients with ectopic 3 observers	Retrospective study to determine if intradecidual sign is accurate for the diagnosis of IUP and the exclusion of ectopic pregnancy.	Patients with IUP had sensitivity of 70%. Ectopic pregnancies had specificity of 100% for the intradecidual sign; the accuracy rate was 75%, PPV 100%, and NPV 43%. Sensitivity for diagnosis of an IUP increases when $\beta$ -hCG levels are $\geq 2,000$ mIU/ml or the mean sac diameter $\geq 3$ mm.	2
7. Mehta TS, Levine D, Beckwith B. Treatment of ectopic pregnancy: is a human chorionic gonadotropin level of 2,000 mIU/mL a reasonable threshold? <i>Radiology</i> 1997; 205(2):569-573.	10	676	Review medical records and US scans to determine whether hCG level of 2,000 mIU/ml is a reasonable threshold for diagnosing ectopic pregnancy in the absence of US findings of IUP in order to prevent inappropriate treatment.	548 patients had evidence of a normal or abnormal IUP. 51 (40%) of the 128 patients without evidence of an IUP had an hCG level $>2,000$ mIU/ml. Of 51 patients, 15 (29%) were treated for ectopic pregnancy; 17 (33%) were not immediately treated for ectopic pregnancy and had a normal IUP at follow-up US. hCG level of 2,000 mIU/ml without US findings of IUP is not diagnostic.	2
8. Nyberg DA, Filly RA, Mahony BS, Monroe S, Laing FC, Jeffrey RB, Jr. Early gestation: correlation of HCG levels and sonographic identification. <i>AJR</i> 1985; 144(5):951-954.	9	49	Compare hCG levels with US findings in patients with normal early IUP to determine the discriminatory level of $\beta$ -hCG.	A gestational sac was always visible when the hCG level was $\geq 1800$ mIU/ml in 36 cases and 357 mIU/ml in one case. Comparison of serum hCG levels with US detection is useful for evaluating early pregnancy.	3
9. Rowling SE, Langer JE, Coleman BG, Nisenbaum HL, Horii SC, Arger PH. Sonography during early pregnancy: dependence of threshold and discriminatory values on transvaginal transducer frequency. <i>AJR</i> 1999; 172(4):983-988.	9	39	Prospective study to determine if normal and abnormal pregnancies could be distinguished at smaller sac sizes with a higher frequency transvaginal transducer than with a 5-MHz transducer.	22 (56%) of 39 were normal or probably normal. Using the 5-MHz transducer, a yolk sac was first seen in a 6.4 mm gestational sac but was not definitively seen in 12 gestational sacs measuring 5-13 mm. Using the 9-5-MHz transducer, yolk sacs were identified in all gestational sacs measuring 4.6-13 mm, and live embryos were seen in five of eight sacs measuring 8.1-13 mm. Study found that ability to visualize the yolk sac and embryo in early pregnancy is dependent on transvaginal transducer frequency.	3

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10. Levi CS, Lyons EA, Lindsay DJ. Early diagnosis of nonviable pregnancy with endovaginal US. <i>Radiology</i> 1988; 167(2):383-385.	9	62	Retrospective analysis of prospectively accumulated data to determine first trimester nonviability at endovaginal US on the basis of gestational sac size and the presence or absence of a yolk sac or embryo.	<ul style="list-style-type: none"> <li>59 patients with gestation sacs <math>\geq 8</math> mm; absence of a yolk sac predicted a nonviable pregnancy with sensitivity of 67%, specificity of 100%.</li> <li>35 patients with gestation sacs <math>\geq 16</math> mm; absence of embryo predicted a nonviable pregnancy with sensitivity of 50% and specificity of 100%.</li> <li>Combining gestation sac size; demonstration of yolk sac, embryo and/or cardiac pulsations) helped in the diagnosis of a nonviable pregnancy with endovaginal US.</li> </ul>	2
11. Levi CS, Lyons EA, Zheng XH, Lindsay DJ, Holt SC. Endovaginal US: demonstration of cardiac activity in embryos of less than 5.0 mm in crown-rump length. <i>Radiology</i> 1990; 176(1):71-74.	10	71	Review US findings to determine the predictive value of the presence or absence of cardiac activity at endovaginal US in embryos of <5 mm Crown-Rump Length (CRL).	<ul style="list-style-type: none"> <li>Endovaginal US failed to show cardiac activity in 5/40 normal embryos: 3 with CRL &lt;2.0 mm and, two between 2.0 and 3.9 mm.</li> <li>Endovaginal US identified cardiac activity in all 12 normal embryos with CRL of 4.0-4.9 mm.</li> <li>Nonvisualization of cardiac activity at endovaginal US in embryos &gt;4.0 mm in CRL may be normal and warrants follow-up US.</li> </ul>	2
12. Doubilet PM, Benson CB. Embryonic heart rate in the early first trimester: what rate is normal? <i>J Ultrasound Med</i> 1995; 14(6):431-434.	13	1,185	Evaluate sonograms to determine prognosis of first trimester pregnancy as a function of heart rate, and to establish normal heart rate of gestational age.	Lower limit of normal is 100 beats per minute (bpm) up to 6.2 weeks' gestation and 120 bpm at 6.3-7.0 weeks.	2
13. Hertzberg BS, Mahony BS, Bowie JD. First trimester fetal cardiac activity. Sonographic documentation of a progressive early rise in heart rate. <i>J Ultrasound Med</i> 1988; 7(10):573-575.	13	124 first trimester fetuses	Determine heart rates of fetuses with real-time sonography and analyze with regard to gestational age.	Mean embryonic heart rate increased from 101 bpm at 5-5.95 menstrual weeks to 143 bpm at 8-8.95 weeks. After nine weeks, the rate reached a plateau, ranging from 137-144 bpm. Slower heart rates are normal early in the first trimester.	2
14. Benson CB, Doubilet PM. Slow embryonic heart rate in early first trimester: indicator of poor pregnancy outcome. <i>Radiology</i> 1994; 192(2):343-344.	13	37	Examine US scans to determine the outcome of early first-trimester pregnancies with slow embryonic heart rates.	An embryonic heart rate $\leq 90$ bpm in the first trimester has a high likelihood of fetal loss before the end of the first trimester. Loss occurred in all embryos with heart rates <70 bpm.	3

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15. Doubilet PM, Benson CB. Outcome of first-trimester pregnancies with slow embryonic heart rate at 6-7 weeks gestation and normal heart rate by 8 weeks at US. <i>Radiology</i> 2005; 236(2):643-646.	13	2,937 patients 1 <sup>st</sup> trimester outcome known 567 patients met all criteria	Retrospective study to determine the outcome of pregnancies with slow embryonic heart rate at 6-7 weeks gestation and normal heart rate by 8 weeks at US.	When a slow embryonic heart rate is detected at 6.0-7.0 weeks, likelihood of subsequent first-trimester loss is high although heart rate is normal at follow-up. Follow-up scan in late first trimester is needed in these pregnancies.	2
16. Bromley B, Harlow BL, Laboda LA, Benacerraf BR. Small sac size in the first trimester: a predictor of poor fetal outcome. <i>Radiology</i> 1991; 178(2):375-377.	10	16 patients 52 controls	Prospective study to determine the predictive value of a small gestational sac (mean sac size [MSS]) minus CRL <5 mm in patients 5.5-9 weeks gestation, and to compare with a group of control patients with normal sac size.	15/16 patients (94%) with first-trimester small sacs had spontaneous abortions. 4/52 control patients (8%) with normal sac sizes had spontaneous abortions.	2
17. Acharya G, Morgan H. First-trimester, three-dimensional transvaginal ultrasound volumetry in normal pregnancies and spontaneous miscarriages. <i>Ultrasound Obstet Gynecol</i> 2002; 19(6):575-579.	9	111	Cross-sectional observational study to correlate 3D US volumetry of intrauterine contents in normal and failed pregnancies with conventional 2D measurements.	3D US volumetry of intrauterine contents in normal and failed pregnancies correlates well with conventional 2D measurements. Volumetric assessment does not improve diagnosis of miscarriage. Further research is needed.	3
18. Horrow MM. Enlarged amniotic cavity: a new sonographic sign of early embryonic death. <i>AJR</i> 1992; 158(2):359-362.	9	25 normal gestations 10 cases of embryonic death	Compare the size of the amniotic cavity with the CRL and the size of the chorionic cavity to determine if enlarged amniotic cavity correlated with embryonic death.	Amniotic cavity that is enlarged relative to the CRL and the size of the chorionic cavity is a proof of embryonic death.	3
19. McKenna KM, Feldstein VA, Goldstein RB, Filly RA. The empty amnion: a sign of early pregnancy failure. <i>J Ultrasound Med</i> 1995; 14(2):117-121.	10	15	Retrospective review to determine whether the “empty amnion” (visualization of an amnion but no identifiable embryonic pole) is a sign of early pregnancy failure.	“Empty amnion” sign is useful in confirming early pregnancy failure.	3
20. Lindsay DJ, Lovett IS, Lyons EA, et al. Yolk sac diameter and shape at endovaginal US: predictors of pregnancy outcome in the first trimester. <i>Radiology</i> 1992; 183(1):115-118.	10	486	Evaluate women who had endovaginal sonography with fetuses <10 weeks menstrual age to establish the normal size and shape of the secondary yolk sac and to assess the value of yolk sac measurement in predicting pregnancy outcome in the first trimester.	<ul style="list-style-type: none"> <li>• Yolk sac diameter &gt;2 standard deviations above the mean when compared with the mean gestational sac diameter allowed prediction of an abnormal pregnancy outcome with sensitivity of 15.6%, a specificity of 97.4%, and PPV of 60.0%.</li> <li>• Yolk sac diameter &gt;2 standard deviations below the mean allowed prediction of an abnormal outcome with a sensitivity of 15.6%, specificity of 95.3%, and PPV of 44.4%.</li> </ul>	2

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21. Bennett GL, Bromley B, Lieberman E, Benacerraf BR. Subchorionic hemorrhage in first-trimester pregnancies: prediction of pregnancy outcome with sonography. <i>Radiology</i> 1996; 200(3):803-806.	13	516	Retrospective review of US images to assess risk of spontaneous abortion relative to size of subchorionic hemorrhage, age of patient, and time of presentation.	Spontaneous abortion rate was higher in large hemorrhages, older women (over 35 years) and earlier pregnancies (<8 weeks).	2
22. Levine D. Ectopic pregnancy. <i>Radiology</i> 2007; 245(2):385-397.	12	N/A	To review and illustrate the sonographic findings of ectopic pregnancy.	Sonography is useful in making the right diagnosis in ectopic pregnancies.	4
23. Lin EP, Bhatt S, Dogra VS. Diagnostic clues to ectopic pregnancy. <i>Radiographics</i> 2008; 28(6):1661-1671.	12	N/A	Review diagnosis of ectopic pregnancy.	Hormonal assays and pelvic US are used for the initial evaluation of ectopic pregnancy.	4
24. Frates MC, Visweswaran A, Laing FC. Comparison of tubal ring and corpus luteum echogenicities: a useful differentiating characteristic. <i>J Ultrasound Med</i> 2001; 20(1):27-31; quiz 33.	9	26 patients with tubal rings 45 control patients with IUP	To compare the echogenicity of the tubal ring of an ectopic pregnancy and the corpus luteum with that of the ovary for improved detection of early ectopic pregnancy.	Tubal ring is usually more echogenic than ovarian parenchyma, and the corpus luteum is usually equal to or less echogenic than the ovary. Echogenicity of an adnexal mass may help differentiate tubal ring from a corpus luteum.	2
25. Stein MW, Ricci ZJ, Novak L, Roberts JH, Koenigsberg M. Sonographic comparison of the tubal ring of ectopic pregnancy with the corpus luteum. <i>J Ultrasound Med</i> 2004; 23(1):57-62.	9	79	Retrospective review of TVS to compare the value of different sonographic features in distinguishing tubal ring from corpus luteum.	Sonographic features for distinguishing tubal ring from corpus luteum include decreased wall echogenicity compared with the endometrium and an anechoic texture, which suggests a corpus luteum.	2
26. Atri M. Ectopic pregnancy versus corpus luteum cyst revisited: best Doppler predictors. <i>J Ultrasound Med</i> 2003; 22(11):1181-1184.	9	80	Prospective study of patients with diagnosed ectopic pregnancy to determine the best Doppler values for differentiating ectopic pregnancy from a corpus luteum cyst of pregnancy.	<ul style="list-style-type: none"> <li>Resistive index &lt;0.39 had specificity of 100% and PPV of 100% for diagnosing ectopic pregnancy but was present in only 15% (CI: 7%-23%) of ectopic pregnancies.</li> <li>Resistive index &gt;0.7 had specificity of 100% and PPV of 100% for diagnosing ectopic pregnancy and was present in 31% (CI: 21%-41%) of ectopic pregnancies.</li> <li>Both low and high resistive indices discriminate ectopic pregnancy from a corpus luteum cyst.</li> </ul>	2
27. Dart R, McLean SA, Dart L. Isolated fluid in the cul-de-sac: how well does it predict ectopic pregnancy? <i>Am J Emerg Med</i> 2002; 20(1):1-4.	9	1 <sup>st</sup> Group - 38 patients with cul-de-sac fluid 2 <sup>nd</sup> Group - 523 patients with indeterminate US	Retrospective cohort study to examine the risk of ectopic pregnancy among patients with isolated abnormal cul-de-sac fluid at TVS. Moderate volume of anechoic fluid was compared with either a large volume of anechoic fluid or any echogenic fluid.	Ectopic pregnancy was diagnosed in 16/38: 42% (95% CI: 26%-59%) of patients with isolated cul-de-sac fluid, 5/23: 22% (95% CI: 7%-42%) of patients with moderate amount of anechoic fluid, and 11/15: 73% (95% CI: 45%-92%) of patients with a large volume of fluid or any echogenic fluid. Patients with isolated abnormal cul-de-sac fluid are at moderate risk for ectopic pregnancy. The risk increases if the fluid is echogenic or the volume is large.	3

\* See Last Page for Key

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28. Nyberg DA, Hughes MP, Mack LA, Wang KY. Extrauterine findings of ectopic pregnancy of transvaginal US: importance of echogenic fluid. <i>Radiology</i> 1991; 178(3):823-826.	9	232 patients Group 1 – 68 patients with proved ectopic gestation Group 2 – 83 patients with reliable evidence of IUP Group 3 – 81 patients with no evidence of pregnancy at initial US	Prospective study of TVS studies to determine the significance of different extrauterine findings, including echogenic fluid in the cul-de-sac in patients with positive serum pregnancy tests considered to be at risk for ectopic pregnancy.	Intraperitoneal fluid was detected in 43 (63%) group 1 patients and in 81 (31%) group 3 patients. Echogenic fluid was the only abnormal finding at US in 10 (15%) group 1 patients and added confidence to the diagnosis of ectopic pregnancy in many others. Echogenic fluid correlated with hemoperitoneum at the time of surgery. Presence of echogenic fluid shows a high risk for ectopic pregnancy.	2
29. Wachsberg RH, Levine CD. Echogenic peritoneal fluid as an isolated sonographic finding: significance in patients at risk of ectopic pregnancy. <i>Clin Radiol</i> 1998; 53(7):520-522.	10	12	Retrospective study of patients with positive pregnancy test in whom sonography revealed echogenic fluid as an isolated finding without evidence of IUP.	Small-to-moderate amount of echogenic fluid noted as an isolated finding may not be highly predictive of ectopic pregnancy.	3
30. Frates MC, Brown DL, Doubilet PM, Hornstein MD. Tubal rupture in patients with ectopic pregnancy: diagnosis with transvaginal US. <i>Radiology</i> 1994; 191(3):769-772.	10	132	Retrospective review of US scans and medical records to determine whether sonography can help diagnose tubal rupture in patients with ectopic pregnancy.	Findings at TVS cannot reliably determine whether tubal rupture is present.	2
31. Ackerman TE, Levi CS, Dashefsky SM, Holt SC, Lindsay DJ. Interstitial line: sonographic finding in interstitial (cornual) ectopic pregnancy. <i>Radiology</i> 1993; 189(1):83-87.	9	12 patients with interstitial ectopic pregnancy 40 patients with different diagnoses	Retrospective study to evaluate the relationship of the endometrial canal and decudua vera to the interstitial gestational sac and to determine if this relationship can be used to increase the predictive value of US in the diagnosis of interstitial ectopic pregnancy.	Interstitial line had better sensitivity (80%) and specificity (98%) than eccentric gestational sac location (sensitivity 40%; specificity 88%) and myometrial thinning (sensitivity, 40%; specificity, 93%) for the diagnosis of interstitial ectopic pregnancy. Interstitial line sign is a useful diagnostic sign of interstitial ectopic pregnancy.	3

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32. Jafri SZ, Loginsky SJ, Bouffard JA, Selis JE. Sonographic detection of interstitial pregnancy. <i>J Clin Ultrasound</i> 1987; 15(4):253-257.	10	11 cases	Review sonographic findings in 11 cases of proven interstitial pregnancy and compare with previous 12 cases.	An ectopic pregnancy was diagnosed in all cases, and an interstitial location was suspected in 5 cases preoperatively. Most common findings were eccentrically located gestational sac surrounded by an asymmetric myometrial mantle and a separate empty uterine cavity with endometrial echoes. Laparoscopy is recommended when interstitial pregnancy is suspected by sonography.	3
33. Jurkovic D, Hillaby K, Woelfer B, Lawrence A, Salim R, Elson CJ. First-trimester diagnosis and management of pregnancies implanted into the lower uterine segment Cesarean section scar. <i>Ultrasound Obstet Gynecol</i> 2003; 21(3):220-227.	13	18 diagnosed cesarean section scar pregnancies	Describe first-trimester US diagnosis and management of pregnancies implanted into uterine cesarean section scars.	Surgical treatment was successful in all 8 cases. The respective success rates of medical treatment and expectant management were 5/7 (71%) and 1/3 (33%). 5 (28%) required blood transfusion and one woman (6%) had a hysterectomy. Cesarean section scar pregnancies are common. If diagnosis is made in the first trimester the prognosis is good and the risk of hysterectomy is relatively low.	3
34. Ushakov FB, Elchalal U, Aceman PJ, Schenker JG. Cervical pregnancy: past and future. <i>Obstet Gynecol Surv</i> 1997; 52(1):45-59.	13	117 cases from literature 3 cases from authors department	Review cases of cervical pregnancy in English literature from 1978 and cases performed in the authors department.	Sonography improved pretreatment diagnosis up to 81.8%. Early diagnosis of cervical pregnancy allowed for treatment by chemotherapy in 32 cases, with an 81.3 % success rate. Serial $\beta$ -hCG levels and TVS with color Doppler are used to monitor therapy.	3
35. Filhastre M, Dechaud H, Lesnik A, Taourel P. Interstitial pregnancy: role of MRI. <i>Eur Radiol</i> 2005; 15(1):93-95.	14	2	Case report to examine role of MRI in interstitial pregnancy.	MRI was able to localize the ectopic pregnancy by showing a gestational structure surrounded by a thick wall in the upper part of the uterine wall separated from the endometrium by an uninterrupted junctional zone in both cases.	4
36. Jung SE, Byun JY, Lee JM, Choi BG, Hahn ST. Characteristic MR findings of cervical pregnancy. <i>J Magn Reson Imaging</i> 2001; 13(6):918-922.	13	12	To assess characteristic MR findings of cervical pregnancy.	Typical MR finding for cervical pregnancy is heterogeneous hemorrhagic mass with densely enhancing papillary solid components.	3
37. Coulier B, Malbecq S, Brinon PE, Ramboux A. MDCT diagnosis of ruptured tubal pregnancy with massive hemoperitoneum. <i>Emerg Radiol</i> 2008; 15(3):179-182.	14	1	Present a case report on diagnosis of ruptured tubal pregnancy with MDCT.	Diagnosis was made using contrast-enhanced MDCT. The radiologist must be aware of the key signs (massive hemoperitoneum with fresh blood clots in the hypogastric area, active free peritoneal extravasation of intravascular contrast material and dramatic peripheral enhancement).	4

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38. Pham H, Lin EC. Adnexal ring of ectopic pregnancy detected by contrast-enhanced CT. <i>Abdom Imaging</i> 2007; 32(1):56-58.	14	1	Case report to examine role of contrast-enhanced CT in a woman with acute right lower quadrant abdominal pain.	Contrast-enhanced CT showed ring enhancing cystic structure in the right adnexa corresponding to tubal ring sign of ectopic pregnancy seen on subsequent pelvic US. Right tubal ectopic pregnancy was confirmed at surgery.	4
39. Medical treatment of ectopic pregnancy. <i>Fertil Steril</i> 2008; 90(5 Suppl):S206-212.	12	N/A	Review medical treatment and diagnosis of early ectopic pregnancies.	Serial serum hCG determinations, TVS examinations, and uterine curettage are appropriate for early diagnosis.	4
40. Green CL, Angtuaco TL, Shah HR, Parmley TH. Gestational trophoblastic disease: a spectrum of radiologic diagnosis. <i>Radiographics</i> 1996; 16(6):1371-1384.	12	N/A	Review diagnosis of gestational trophoblastic disease (GTD) with emphasis on the unique information provided by different diagnostic tools.	Although US is recommended for initial diagnosis, radiography, angiography, CT, and MRI all play a role in determining the presence of GTD and the extent of its complications. US shows molar gestations as alternating cystic and solid tissue that fills the entire uterus. CT and MRI are useful in detecting myometrial invasion, parametrial extension, and metastasis.	4
41. Zhou Q, Lei XY, Xie Q, Cardoza JD. Sonographic and Doppler imaging in the diagnosis and treatment of gestational trophoblastic disease: a 12-year experience. <i>J Ultrasound Med</i> 2005; 24(1):15-24.	9	355	Retrospective analysis of cases of GTD in two hospitals to evaluate the clinical utility of sonography with Doppler examination in the diagnosis and treatment of GTD.	106/355 cases had hydatidiform mole (CHM), 33 had a partial hydatidiform mole (PHM), 184 had an invasive hydatidiform mole (IHM), and 32 had choriocarcinoma. Sonography showed abnormal molar tissue confined to the endometrial cavity in all cases of CHM. Doppler waveforms showed resistive indices of 0.55 for CHM, 0.56 for PHM, 0.28 for IHM, 0.25 for choriocarcinoma, and 0.66 for normal pregnancies. Sonography and Doppler imaging were helpful in diagnosing GTD, in determining whether invasive disease was present, in detecting recurrence of disease, and in following the effectiveness of chemotherapy.	2
42. Barton JW, McCarthy SM, Kohorn EI, Scoutt LM, Lange RC. Pelvic MR imaging findings in gestational trophoblastic disease, incomplete abortion, and ectopic pregnancy: are they specific? <i>Radiology</i> 1993; 186(1):163-168.	10	39	Study patients with abnormally elevated levels of $\beta$ -hCG to determine whether findings at MRI are specific for primary molar disease, persistent GTD, incomplete abortion, and ectopic pregnancy.	MRI findings in persistent GTD, incomplete abortion, and ectopic pregnancy are relatively nonspecific, but MRI can depict invasive disease that may change treatment in patients with documented GTD.	3

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43. Kwon JH, Kim GS. Obstetric iatrogenic arterial injuries of the uterus: diagnosis with US and treatment with transcatheter arterial embolization. <i>Radiographics</i> 2002; 22(1):35-46.	13	24 cases	Retrospective review to determine value of US in detection and diagnosis of uterine vascular abnormalities and the value of transcatheter arterial embolization in treating these conditions.	Color and duplex Doppler US is recommended for detection and diagnosis and follow-up of patients after embolization. Transcatheter arterial embolization is a safe and effective method.	3
44. Shellock FG, Crues JV. MR procedures: biologic effects, safety, and patient care. <i>Radiology</i> 2004; 232(3):635-652.	12	N/A	Review MR biologic effects, safety, and patient care.	To prevent accidents in the MR environment, it is necessary to revise information on biologic effects and safety according to changes that have occurred in MR technology and with regard to current guidelines for biomedical implants and devices.	4
45. De Wilde JP, Rivers AW, Price DL. A review of the current use of magnetic resonance imaging in pregnancy and safety implications for the fetus. <i>Prog Biophys Mol Biol</i> 2005; 87(2-3):335-353.	12	N/A	Review use of MRI in pregnancy and risks to the fetus. The hazards discussed are biological effects, miscarriage, heating effects and acoustic noise exposure.	Need for further research into effects of MRI. Need for further research into the effects of MRI in pregnancy.	4
46. Kanal E, Barkovich AJ, Bell C, et al. ACR guidance document for safe MR practices: 2007. <i>AJR Am J Roentgenol</i> 2007; 188(6):1447-1474.	15	N/A	ACR guidance document for safe MR practices. Purpose of document is to guide MR facilities in the development of safe MR programs.	N/A	3
47. OMNISCAN® package insert: Nycomed Imaging A.S. Princeton, NJ.	N/A	N/A	Package insert.	N/A	4
48. American College of Radiology. <i>Manual on Contrast Media</i> . Available at: <a href="http://www.acr.org/SecondaryMainMenuCategories/quality_safety/contrast_manual.aspx">http://www.acr.org/SecondaryMainMenuCategories/quality_safety/contrast_manual.aspx</a> .	15	N/A	Guidance document on contrast media to assist radiologists in recognizing and managing risks associated with the use of contrast media.	N/A	3
49. Hurwitz LM, Yoshizumi T, Reiman RE, et al. Radiation dose to the fetus from body MDCT during early gestation. <i>AJR</i> 2006; 186(3):871-876.	13	N/A	To determine radiation dose to the fetus at early gestation when MDCT scanners are used for clinical indications.	0 and 3 months respectively: renal stone protocol, 0.8-1.2 and 0.4-0.7 cGy; appendix protocol, 1.52-1.68 and 2-4 cGy; and pulmonary embolus protocol, 0.024-0.047 and 0.061-0.066 cGy.	2
50. McCollough CH, Schueler BA, Atwell TD, et al. Radiation exposure and pregnancy: when should we be concerned? <i>Radiographics</i> 2007; 27(4):909-917; discussion 917-908.	12	N/A	Review radiation exposure doses from diagnostic imaging examinations in pregnancy.	Since fetal risks from diagnostic imaging examinations are estimated to be minimal, radiologic and nuclear medicine examinations should not be withheld from pregnant women when clinically indicated.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
51. Brenner DJ, Hall EJ. Computed tomography--an increasing source of radiation exposure. <i>N Engl J Med</i> 2007; 357(22):2277-2284.	12	N/A	Review the nature of CT, radiation doses delivered by CT examinations, rates of CT examination use and its main clinical applications.	Compared with radiography, CT involves higher doses of radiation. Rates of CT scanning have rapidly increased since inception and the population exposure to radiation from CT should be considered a potential public health hazard.	4
52. NRC (National Research Council). 2006. <i>Health Risks from Exposure to Low Levels of Ionizing Radiation. BEIR VII Phase 2</i> . Washington, DC: National Academy Press.	12	N/A	Executive summary that comprehensively reviews the literature on radiation biology and develops risk estimates for cancer and other health effects from low levels of ionizing radiation.	The available biological and biophysical data support a "linear no threshold" (LNT) model that the risk of cancer proceeds in a linear fashion at lower doses without a threshold and that the smallest dose has the potential to cause a small increase risk in humans.	4
53. Webb JA, Thomsen HS, Morcos SK. The use of iodinated and gadolinium contrast media during pregnancy and lactation. <i>Eur Radiol</i> 2005; 15(6):1234-1240.	15	N/A	Review literature to create guideline on the use of iodinated and gadolinium-based contrast media in pregnant or lactating women. Limited information is available on this subject.	N/A	4
54. Bly S, Van den Hof MC. Obstetric ultrasound biological effects and safety. <i>J Obstet Gynaecol Can</i> 2005; 27(6):572-580.	15	N/A	Review literature to examine the biological effects and safety of obstetric US.	Obstetric US should only be done for medical reasons, and exposure should be kept as low as reasonably achievable because of the potential for tissue heating.	4

## Evidence Table Key

### Study Type Key

*Numbers 1-7 are for studies of therapies while numbers 8-15 are used to describe studies of diagnostics.*

1. Randomized Controlled Trial — Treatment
2. Controlled Trial
3. Observation Study
  - a. Cohort
  - b. Cross-sectional
  - c. Case-control
4. Clinical Series
5. Case reviews
6. Anecdotes
7. Reviews
8. Randomized Controlled Trial — Diagnostic
9. Comparative Assessment
10. Clinical Assessment
11. Quantitative Review
12. Qualitative Review
13. Descriptive Study
14. Case Report
15. Other (Described in text)

### Strength of Evidence Key

- Category 1 - The conclusions of the study are valid and strongly supported by study design, analysis and results.
- Category 2 - The conclusions of the study are likely valid, but study design does not permit certainty.
- Category 3 - The conclusions of the study may be valid but the evidence supporting the conclusions is inconclusive or equivocal.
- Category 4 - The conclusions of the study may not be valid because the evidence may not be reliable given the study design or analysis.