

Rh- Alloimmunization

Topic- based Uworld Questions

Block 1, 2, 7, 8





A 24-year-old primigravida comes to the emergency department for evaluation of pelvic pain. The pain began a week ago as mild cramping but is now constant and severe. The patient had a positive home pregnancy test 3 weeks ago and has also recently had some brown vaginal spotting. She has no chronic medical conditions or previous surgeries. Blood pressure is 110/60 mm Hg and pulse is 108/min. The abdomen is tender to palpation over the left lower quadrant and rebound is present. Initial laboratory results are as follows:

Hemoglobin	10.8 g/dL
β -hCG	19,448 IU/L
Blood type	A negative
Coombs test	negative

Pelvic ultrasound shows a small uterus with a thin endometrium, an 8-week fetal pole in the left adnexa with cardiac motion, and a large amount of free fluid in the pelvis. Laparoscopy confirms hemoperitoneum and a ruptured left fallopian tube; a left salpingectomy is subsequently performed. On postoperative day 1, the patient's blood pressure is 116/78 mm Hg and pulse is 88/min. Repeat laboratory results are as follows:

Hemoglobin	10 g/dL
β -hCG	12,987 IU/L

Which of the following is the best next step in management of this patient?

- A. Anti-D immunoglobulin
- B. Intramuscular methotrexate
- C. No additional management indicated
- D. Suction curettage
- E. Vaginal misoprostol

Hemoglobin	10.8 g/dL
β -hCG	19,448 IU/L
Blood type	A negative
Coombs test	negative

Pelvic ultrasound shows a small uterus with a thin endometrium, an 8-week fetal pole in the left adnexa with cardiac motion, and a large amount of free fluid in the pelvis. Laparoscopy confirms hemoperitoneum and a ruptured left fallopian tube; a left salpingectomy is subsequently performed. On postoperative day 1, the patient's blood pressure is 116/78 mm Hg and pulse is 88/min. Repeat laboratory results are as follows:

Hemoglobin	10 g/dL
β -hCG	12,987 IU/L

Which of the following is the best next step in management of this patient?

- A. Anti-D immunoglobulin
- B. Intramuscular methotrexate
- C. No additional management indicated
- D. Suction curettage
- E. Vaginal misoprostol

Submit

Hemoglobin	10.8 g/dL
β -hCG	19,448 IU/L
Blood type	A negative
Coombs test	negative

Pelvic ultrasound shows a small uterus with a thin endometrium, an 8-week fetal pole in the left adnexa with cardiac motion, and a large amount of free fluid in the pelvis. Laparoscopy confirms hemoperitoneum and a ruptured left fallopian tube; a left salpingectomy is subsequently performed. On postoperative day 1, the patient's blood pressure is 116/78 mm Hg and pulse is 88/min. Repeat laboratory results are as follows:

Hemoglobin	10 g/dL
β -hCG	12,987 IU/L

Which of the following is the best next step in management of this patient?

- A. Anti-D immunoglobulin (57%)
- B. Intramuscular methotrexate (8%)
- C. No additional management indicated (25%)
- D. Suction curettage (6%)
- E. Vaginal misoprostol (0%)

Omitted

Correct answer



57%

Answered correctly



05 secs

Time Spent



02/25/2020

Last Updated

Indications for prophylactic administration of anti-D immunoglobulin for Rh(D)-negative patients*

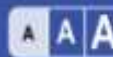
- At 28-32 weeks gestation
- <72 hours after delivery of Rh(D)-positive infant
- <72 hours after spontaneous abortion
- Ectopic pregnancy
- Threatened abortion
- Hydatidiform mole
- Chorionic villus sampling, amniocentesis
- Abdominal trauma
- 2nd- & 3rd-trimester bleeding
- External cephalic version

*Antepartum prophylaxis is not indicated if the father is Rh(D) negative.

Rh(D) alloimmunization occurs when Rh(D)-negative mothers develop anti-D antibodies due to pregnancy with a Rh(D)-positive fetus. Although most cases of Rh(D) alloimmunization are associated with delivery of a Rh(D)-positive infant, alloimmunization can occur whenever there is significant **fetomaternal blood mixing**, such as in this patient with a **ruptured ectopic pregnancy**. Even at an early gestational age, fetal red blood cells carrying the foreign Rh(D) antigen can enter maternal circulation and induce production of maternal anti-D antibodies. In future pregnancies with a Rh(D)-positive fetus, these maternal antibodies can cross the placenta and destroy fetal red blood cells, leading to hemolytic disease of the newborn (ie, [hydrops fetalis](#)).

Therefore, all women with bleeding in pregnancy (eg, [ectopic pregnancy](#)) require maternal blood typing. Those who are **Rh(D)-negative** and have a negative antibody screen (eg, negative Coombs test), such as this patient, are administered **anti-D immunoglobulin** because the fetal blood type is typically unknown and potentially Rh(D)-positive. Anti-D immunoglobulin masks Rh(D) antigens on fetal red blood cells, thereby preventing maternal anti-D antibody production and alloimmunization (**Choice C**).

(**Choice B**) Intramuscular methotrexate is used for medical treatment of some ectopic pregnancies (eg, small size, no fetal cardiac motion). It is



*Antepartum prophylaxis is not indicated if the father is Rh(D) negative.

Rh(D) alloimmunization occurs when Rh(D)-negative mothers develop anti-D antibodies due to pregnancy with a Rh(D)-positive fetus. Although most cases of Rh(D) alloimmunization are associated with delivery of a Rh(D)-positive infant, alloimmunization can occur whenever there is significant **fetomaternal blood mixing**, such as in this patient with a **ruptured ectopic pregnancy**. Even at an early gestational age, fetal red blood cells carrying the foreign Rh(D) antigen can enter maternal circulation and induce production of maternal anti-D antibodies. In future pregnancies with a Rh(D)-positive fetus, these maternal antibodies can cross the placenta and destroy fetal red blood cells, leading to hemolytic disease of the newborn (ie, [hydrops fetalis](#)).

Therefore, all women with bleeding in pregnancy (eg, [ectopic pregnancy](#)) require maternal blood typing. Those who are **Rh(D)-negative** and have a negative antibody screen (eg, negative Coombs test), such as this patient, are administered **anti-D immunoglobulin** because the fetal blood type is typically unknown and potentially Rh(D)-positive. Anti-D immunoglobulin masks Rh(D) antigens on fetal red blood cells, thereby preventing maternal anti-D antibody production and alloimmunization (**Choice C**).

(Choice B) Intramuscular methotrexate is used for medical treatment of some ectopic pregnancies (eg, small size, no fetal cardiac motion). It is not administered after salpingectomy because salpingectomy removes the entire fallopian tube containing the ectopic pregnancy.

(Choice D) [Suction curettage](#) may be indicated for persistent uterine bleeding (eg, incomplete abortion, retained products of conception) but not for an ectopic pregnancy. β -hCG levels remain temporarily elevated in patients after a recent ectopic removal but will decrease and eventually trend to zero.

(Choice E) Vaginal misoprostol can be used for medical termination of an intrauterine pregnancy by causing cervical dilation and uterine contractions. It is not used in the management of ectopic pregnancy.

Educational objective:

Ectopic pregnancies can cause Rh(D) alloimmunization in Rh(D)-negative women due to fetomaternal blood mixing and maternal anti-D antibody production. Therefore, Rh(D)-negative women require anti-D immunoglobulin after an ectopic pregnancy.

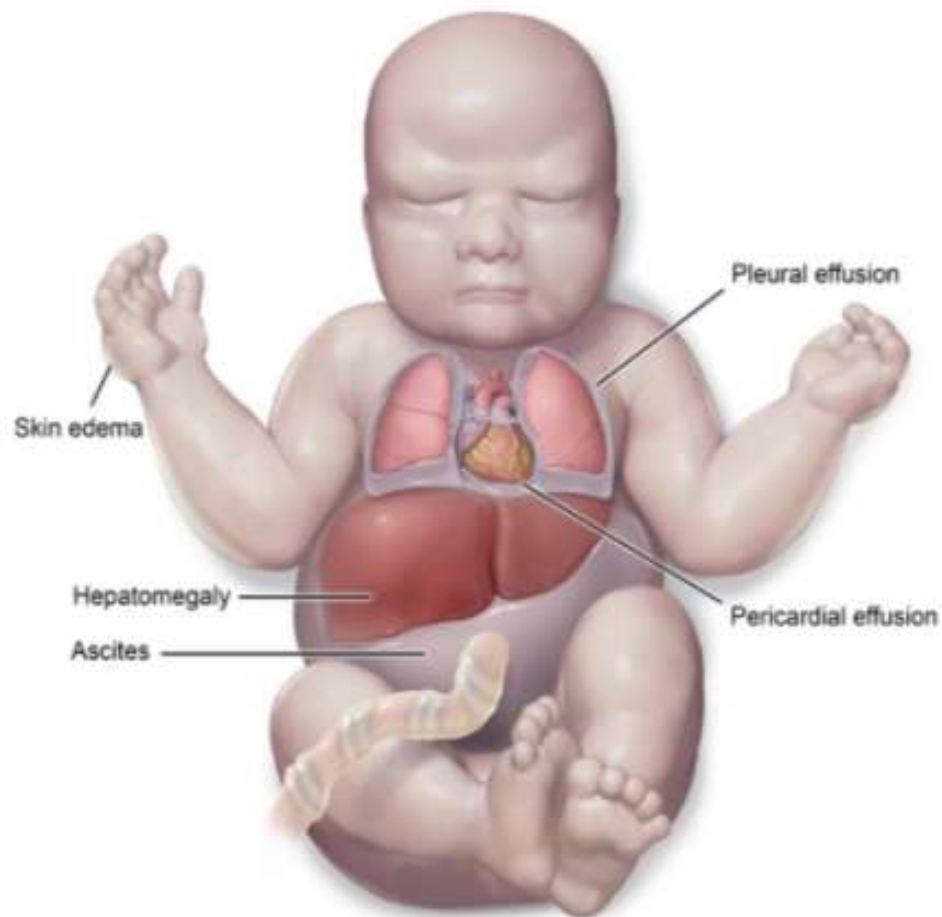
References

- [Practice bulletin no. 181: prevention of Rh\(D\) alloimmunization.](#)

- < 72 hours after delivery of Rh(D)-positive infant

Exhibit Display

Hydrops fetalis



©UWorld

Zoom In

Zoom Out

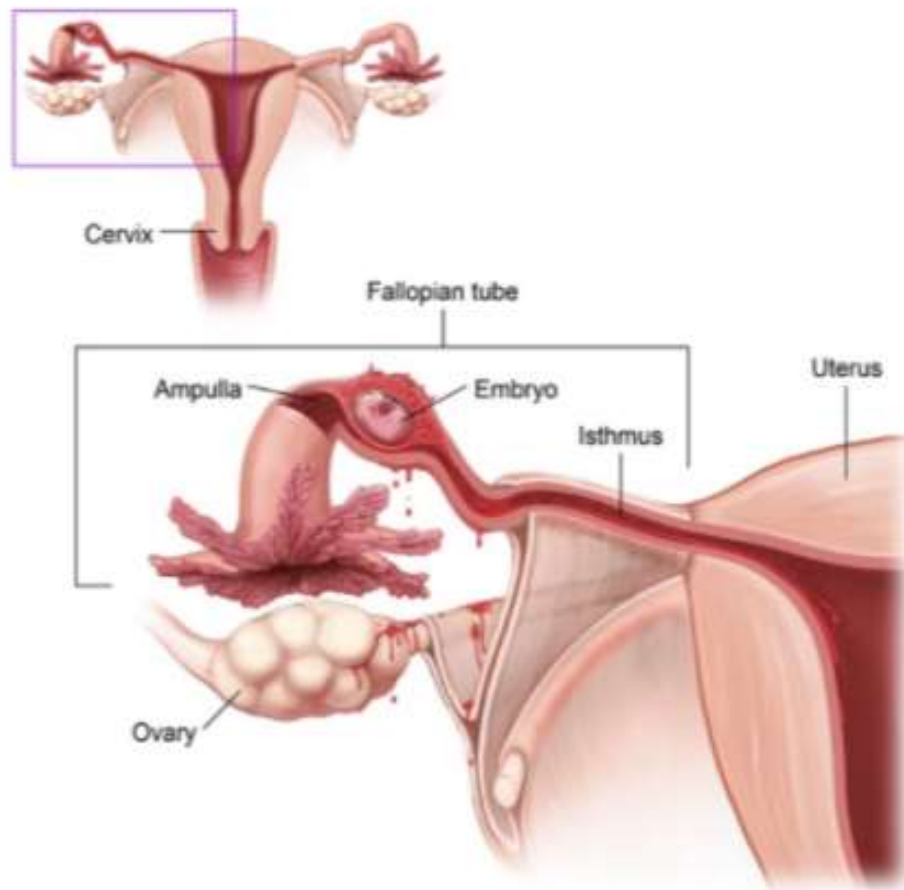
Reset

Add To New Card | Existing Card

- < 72 hours after delivery of Rh(D)-positive infant

Exhibit Display

Ectopic pregnancy with ruptured fallopian tube

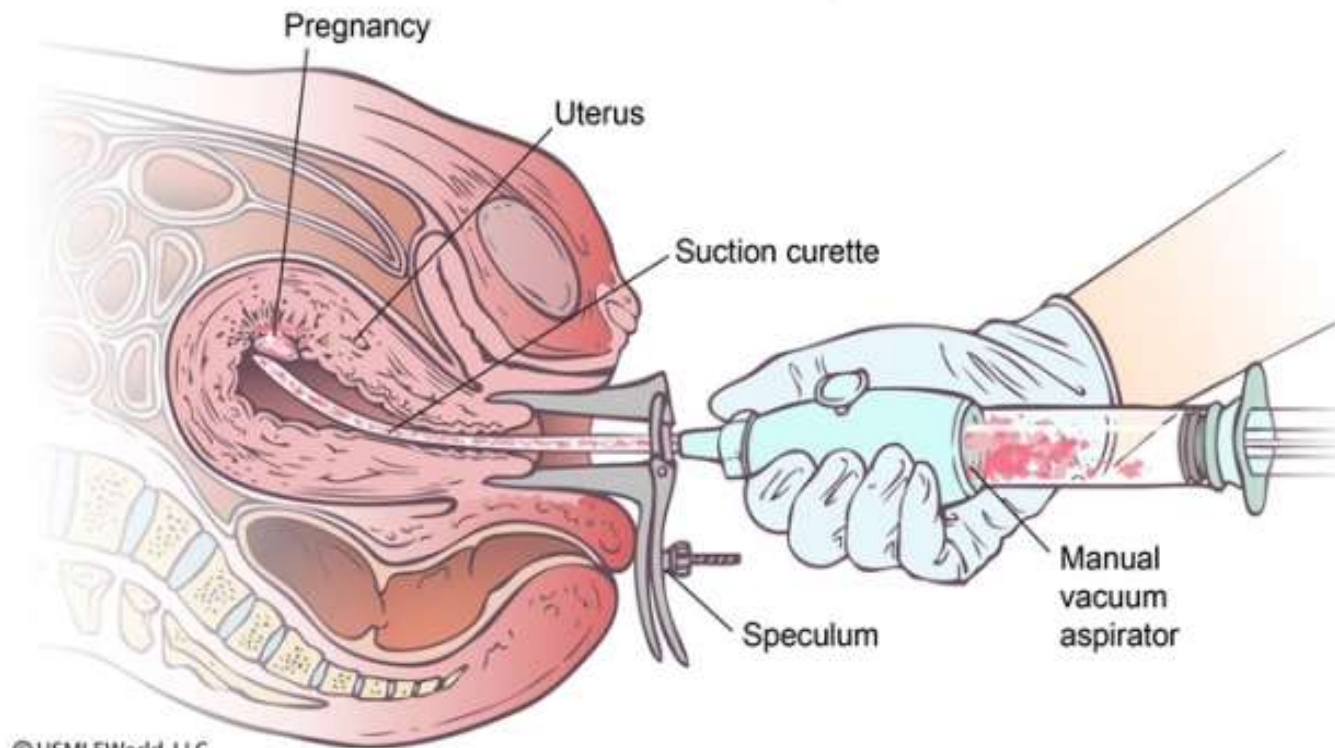


©World

- <72 hours after delivery of Rh(D)-positive infant

Exhibit Display

Suction curettage



A 24-year-old primigravid woman at 10 weeks gestation is brought to the emergency department for vaginal bleeding. She has colicky pain in the suprapubic region radiating to her back. Her temperature is 37 C (98.7 F), blood pressure is 110/76 mm Hg, pulse is 94/min, and respirations are 18/min. Physical examination shows a dilated cervix with visible products of conception. Suction curettage is performed and all products of conception are evacuated. Maternal serum laboratory results are as follows:

Hematocrit	32%
Leukocyte count	8,000/ μ L
Blood type	AB negative
Anti-Rh antibody titer	Negative

Which of the following is the most appropriate next step in management of this patient?

- A. Administer anti-D immune globulin to the woman
- B. No further workup or therapy for the woman or fetus
- C. Order maternal antiphospholipid antibodies
- D. Order maternal blood and endometrial cultures
- E. Order maternal karyotyping
- F. Order maternal thyroid function testing

Submit

A 24-year-old primigravid woman at 10 weeks gestation is brought to the emergency department for vaginal bleeding. She has colicky pain in the suprapubic region radiating to her back. Her temperature is 37 C (98.7 F), blood pressure is 110/76 mm Hg, pulse is 94/min, and respirations are 18/min. Physical examination shows a dilated cervix with visible products of conception. Suction curettage is performed and all products of conception are evacuated. Maternal serum laboratory results are as follows:

Hematocrit	32%
Leukocyte count	8,000/ μ L
Blood type	AB negative
Anti-Rh antibody titer	Negative

Which of the following is the most appropriate next step in management of this patient?

- A. Administer anti-D immune globulin to the woman (81%)
- B. No further workup or therapy for the woman or fetus (11%)
- C. Order maternal antiphospholipid antibodies (4%)
- D. Order maternal blood and endometrial cultures (1%)
- E. Order maternal karyotyping (0%)
- F. Order maternal thyroid function testing (0%)

Omitted

Correct answer

A



81%

Answered correctly



01 sec

Time Spent



06/20/2020

Last Updated

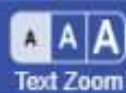
Indications for prophylactic administration of anti-D immunoglobulin for Rh(D)-negative patients*

- At 28-32 weeks gestation
- <72 hours after delivery of Rh(D)-positive infant
- <72 hours after spontaneous abortion
- Ectopic pregnancy
- Threatened abortion
- Hydatidiform mole
- Chorionic villus sampling, amniocentesis
- Abdominal trauma
- 2nd- & 3rd-trimester bleeding
- External cephalic version

*Antepartum prophylaxis is not indicated if the father is Rh(D) negative.

The Rhesus (Rh) blood group system is composed of 5 antigens. The most common involved in fetal and neonatal disease is the D antigen because it is the most immunogenic. **Rh(D) antigen alloimmunization** occurs when **Rh(D)-positive fetal erythrocytes** enter the bloodstream of an **Rh(D)-negative pregnant woman** and the pregnant woman develops antibodies against the D antigen present on the fetal erythrocytes. Although the anti-D antibodies do not affect the fetus of this index pregnancy, these antibodies are potentially hazardous in subsequent pregnancies. If the alloimmunized woman has a subsequent pregnancy with an Rh(D) positive fetus, the pregnant woman's anti-D antibodies will bind and lyse the fetal erythrocytes.

Therefore, the unsensitized Rh(D)-negative pregnant woman should receive **anti-D immune globulin** (RhoGAM) to lower her risk of Rh(D) alloimmunization and the development of **hemolytic disease of the newborn** in a subsequent pregnancy. The placenta is a barrier between the pregnant woman and fetus, but fetal erythrocytes may enter the pregnant woman's circulation during an **abortion** (spontaneous or induced), **procedures** such as amniocentesis, or during **delivery**. Anti-D immune globulin is administered at these critical times and binds the D antigens



Therefore, the unsensitized Rh(D)-negative pregnant woman should receive **anti-D immune globulin** (RhoGAM) to lower her risk of Rh(D) alloimmunization and the development of **hemolytic disease of the newborn** in a subsequent pregnancy. The placenta is a barrier between the pregnant woman and fetus, but fetal erythrocytes may enter the pregnant woman's circulation during an **abortion** (spontaneous or induced), **procedures** such as amniocentesis, or during **delivery**. Anti-D immune globulin is administered at these critical times and binds the D antigens on the fetal erythrocytes in the pregnant woman's circulation, thereby preventing formation of anti-D antibodies.

If a mother is already sensitized (elevated antibody titers), administration of anti-D immune globulin is not helpful and close fetal monitoring for hemolytic disease is required.

(Choice B) Without treatment, the patient may develop anti-D antibodies that may affect a subsequent pregnancy with an Rh(D)-positive fetus.

(Choices C and F) Antiphospholipid antibodies, parental karyotyping, and thyroid-stimulating hormone are typically checked in cases of recurrent pregnancy loss. These do not apply to this patient, who is experiencing a first miscarriage.

(Choice D) Patients with septic abortions are typically febrile with sanguinopurulent discharge. Blood and endometrial cultures should be sent when an intrauterine infection is suspected but would be low yield in other spontaneous abortions.

(Choice E) Karyotyping of fetal tissue is not indicated after one spontaneous miscarriage but may be considered after recurrent pregnancy loss or loss in the second trimester.

Educational objective:

Anti-D immune globulin (RhoGAM) is indicated in unsensitized, Rh-negative women at 28 weeks gestation or within 72 hours of any procedure or incident in which there is any possibility of feto-maternal blood mixing.

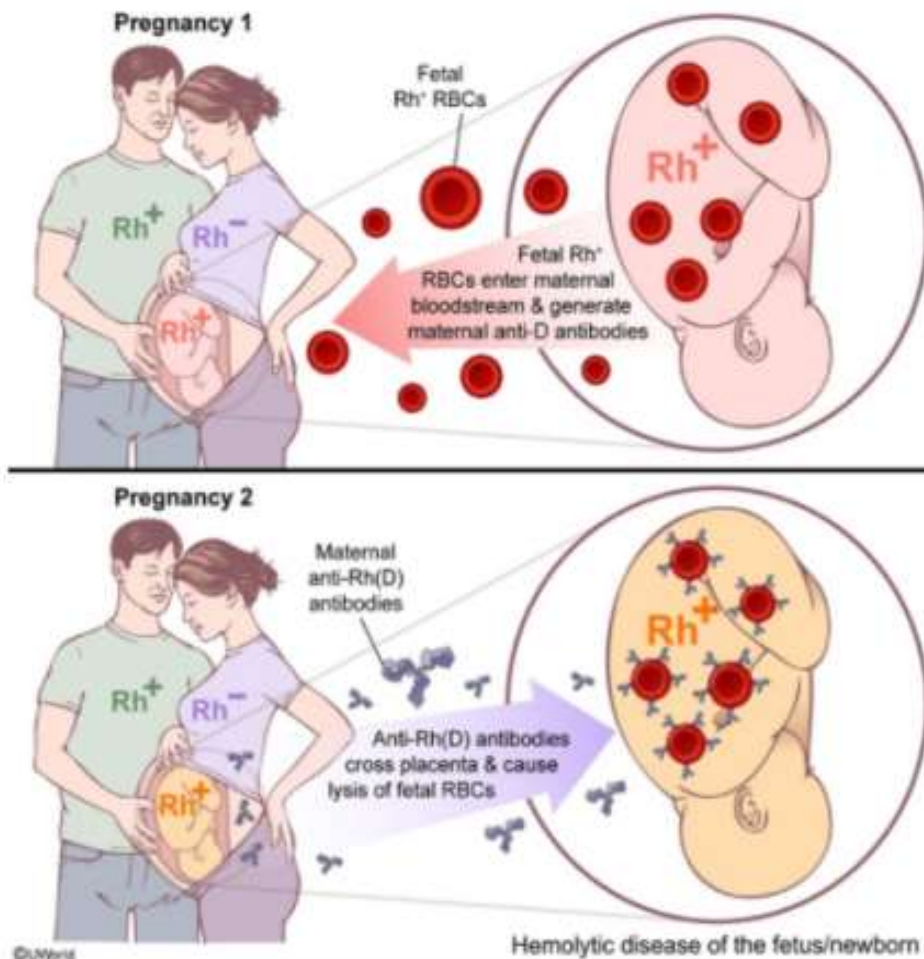
References

- [ACOG practice bulletin. Prevention of Rh D alloimmunization. Number 4, May 1999](#)

Antepartum prophylaxis is not indicated in the patient is Rh(D) negative.

Exhibit Display

Rh alloimmunization



incident in which there is any possibility of feto-maternal blood mixing.