

Safety of Contrast Material Use During Pregnancy and Lactation

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KEYWORDS

- Contrast media • Pregnancy • Lactation • Iodinate-based contrast media
- Gadolinium-based contrast media • Contrast-enhanced ultrasound • Barium sulfate

KEY POINTS

- The American College of Radiology does not recommend withholding the use of iodinated contrast agents in patients who are pregnant or potentially pregnant.
- Gadolinium-based contrast agents are category C drugs as determined by the Food and Drug Administration and their use in pregnancy is restricted to situations in which the potential benefits of imaging significantly outweigh the potential risk to the fetus.
- It is generally considered safe to continue breastfeeding after receiving contrast agents (iodinated and gadolinium-based), as only a small percentage is excreted in breast milk and absorbed by the infant.
- Premedication to reduce the risk of contrast media reactions should not be withheld because of pregnancy.

INTRODUCTION

Despite the exponential increase in the number of patients who are pregnant receiving contrast media, the incidence of adverse side effects remains small. However, even with the significant improvements in the structure of contrast media during the past few decades, the effects on the human embryo and fetus are incompletely understood. Therefore, different guidelines have been suggested for their use in these patients.

Here we review the use of iodinated contrast material for computed tomography (CT), radiographs and fluoroscopy, barium, gadolinium-

based contrast material for MR imaging, and contrast agents to enhance ultrasound. It is our opinion that radiologists must have detailed knowledge regarding different options of contrast media agents in patients who are pregnant or lactating. We highlight the risks of contrast administration, choice of available agents, potential teratogenic effects, and current clinical recommendations for their correct use.

OVERVIEW

Radiological examinations are infrequently performed for nonobstetric conditions during

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pregnancy to avoid exposure of the fetus to ionizing radiation in the case of radiographs and CT or the potentially harmful effects of gadolinium in MR imaging. However, the number of imaging studies in this group of patients has doubled over the past decade in the United States, with an actual increase rate of 107%.¹ The leading indications for obtaining imaging studies in patients who are pregnant are trauma and suspected pulmonary emboli.² Although there has been an increase in the utilization of radiological examinations, awareness, concerns, and misconceptions about their correct use and potential risks to the mother and fetus are still prevalent among radiologists and referring physicians. These concerns have led to unnecessary anxiety in patients, delays in medical interventions, interruption of breastfeeding, and even termination of pregnancy.

Radiological examinations in patients who are pregnant can be divided into 2 main categories: modalities that use ionizing radiation (radiography, CT, nuclear scintigraphy, and fluoroscopy) and those that do not use ionizing radiation (MR imaging and ultrasonography). Each of these modalities has its own potential risks to the mother and fetus,^{2,3} and therefore it is advisable that before imaging a patient who is pregnant, radiologists and referring physicians consider the type of imaging modality that will result in the most valuable information.

When radiological examinations are performed on patients who are pregnant the main concern is exposure to ionizing radiation or the potential effects of MR imaging on the fetus, but the adverse effects related to the administration of contrast media also should be considered. Contrast media may be defined as any substance introduced into any part of the body to improve the visibility of internal structures during imaging examinations.^{4,5} Depending on the imaging modality, different types of contrast media have been used to improve imaging accuracy, and approximately one-half of 76 million CT and 34 million MR imaging examinations performed every year use intravenous (IV) contrast agents.⁶ The use of these agents in patients who are pregnant or lactating is recommended only if the benefits outweigh their potential risks. Additionally, because breastfeeding is recommended as the only source of feeding during the first 6 months of life,⁷ temporary cessation can lead to complete weaning.

IODINATED CONTRAST AGENTS

Imaging of women who are pregnant has recently increased, as demonstrated by Lazarus and

colleagues¹ who observed an increased rate of 107% of radiological studies in pregnant women between 1997 and 2007. The imaging modality that was used the most was CT, especially chest CT, which often entails the use of iodinated contrast media.

Types of Iodinated Contrast Media

Currently used iodinated contrast media are chemical modifications of the 2,4,6-triiodinated benzene ring. They are classified on the basis of their chemical structures, osmolality, iodine content, and ionization in solution. According to their osmolality, the most commonly used classification of contrast media is high-osmolality contrast media (HOCM) having 5 to 8 times the osmolality of plasma; low-osmolality contrast media (LOCM) having 2 to 3 times the osmolality of serum; and iso-osmolar contrast media, which is increasingly used, having the same osmolality as blood, plasma, and cerebrospinal fluid.⁸

The incidence of mild and moderate contrast reactions is higher for HOCM (6%–8%) than for LOCM (0.2%).⁸ In general, iodinated contrast media are considered safe for pregnant women and lactating mothers.^{3,9}

National and International Regulations

Food and Drug Administration regulations

Most iodinated contrast agents are classified as pregnancy category B drugs, with the exception of diatrizoate meglumine and diatrizoate meglumine sodium, the parenteral forms of which are listed as category C.¹⁰

American College of Obstetricians and Gynecologists

On February 2016, the American College of Obstetricians and Gynecologists published guidelines for diagnostic imaging during pregnancy and lactation. The use of iodinated contrast is recommended only if absolutely required to obtain additional diagnostic information that will affect the care of the fetus or mother during pregnancy. Its use carries a low risk of adverse effects and anaphylactic reactions.¹¹

European Society of Radiology

Fetal exposure to iodinated contrast media and any associated free iodide is likely to be relatively short-lived. Because it is standard pediatric practice to screen all infants for hypothyroidism during the first week, the special recommendation is to ensure that those infants exposed to contrast media during pregnancy are screened for this condition.⁹

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