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Effect of Contrast Agents on Pregnant Women

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Guideline	Iodinated Contrast Agents	Gadolinium-based Contrast Agents
	Pregnancy	
Considerations	Data on fetal exposure to iodinated contrast agents are scarce	Few studies have evaluated fetal exposure to gadolinium
	No malformations or side effects have been reported in newborns	There have been no studies on long-term risks in humans
	Iodinated products given during pregnancy may induce neonatal hypothyroidism	Free gadolinium could potentially lead to neurotoxicity
Recommendations	Screening newborns for hypothyroidism during the 1st week of life is standard pediatric practice	Consensus is that gadolinium should not be used during pregnancy unless the benefits outweigh the risks
	Iodinated contrast agents must be essential for making the diagnosis	
	Informed consent as to the risks and benefits of the procedure is recommended	
	Use of topical iodine is contraindicated	
	Lactation	
Considerations	Dose of iodinated contrast agent in breast milk absorbed by the infant is 0.5% of the maternal dose	About 0.01% of the maternal gadolinium dose is excreted into breast milk
	Breast-feeding after the injection of iodinated contrast agent is safe	Breast-feeding after the injection of gadolinium-based contrast agent is safe
Recommendations	Concerned mothers may be instructed to discard breast milk for 24 hours after injection to eliminate fetal exposure to contrast agent	Concerned mothers may be instructed to discard breast milk for 24 hours after injection to eliminate fetal exposure to contrast agent
	Use of topical iodine is contraindicated because free iodine excretion may induce neonatal hypothyroidism	

Figure 1: Guidelines of contrast agents in pregnancy.

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Introduction

Many Clinical conditions require radiological diagnosis exams based on emission of different kind of energy and the use of contrast agent such as Computed Tomography (CT), PET, MR imaging, Ultrasound and x-ray imaging. In Radiological examinations we use different kind of contrast media such as iodinated contrast agents, gadolinium, gestrographin, barium sulfate, and nano bubbles in contrast enhanced ultrasound. A non-iodinated contrast media is one that does not contain iodine and may instead contain barium or other non-iodinated media as the radio opaque substance. In recent times, there is an increased use of contrast agents in Pregnant women hence we should study the effect of contrast agents in maternal and fetal life. In the medical field, the use of contrast media in pregnant women is somehow restricted because we don't have wide and prospective studies related to those patients and its effects on pregnant women or on its foetus. But we know the importance of contrast studies in such patients in particular case and we can minimize its effect of contrast media in such patients by using them properly and by following the international Association guidelines and by using ALARA (As Low As Reasonably Achievable) principle .

Classification of Contrast Agents

Contrast agents can be defined as the agents introduced in a body during imaging Examinations to improve visualization of internal structures of the body. In medical imaging we use both ionic and non- ionic Contrast agents [1]. In computed Tomography iodinated agents are used to improve detection rate of imaging. The Food and Drug Administration (FDA) classified the Iodinated contrast as pregnancy category B drugs as they are considered safe for pregnant women and lactating mothers. Animal reproduction studies have shown an adverse effect on

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animal foetus there are no well controlled studies in human beings and the effects of contrast agent on pregnant women and foetus. But there are potential benefits which may justify potential risks in human beings [2]. American college of obstetrics and gynecologists recommended the use of contrast agents for additional diagnosis [3].

Iodinate Contrast Agents

Iodinated contrast agents can be classified according to osmolarity, ionicicity and number of benzene rings. The incidence of mild and moderate contrast reaction is higher for higher osmolar contrast media approximately 6-8% and it is lower for lower osmolar contrast media approximately 0-2% though their radiopacity is almost the same. Adverse effect on pregnant women is same as in general population like hypersensitivity, thyroid dysfunction, nephropathy. There is no evidence of tetrogenic or mutagenic effects on mother or foetus during pregnancy. The transplacental passage of ionic agents has been demonstrated on animals as the contrast agent enters into the foetus it removed in foetal urine. However there is no clear evidence of non-ionic contrast agents in transplacental passage. Cohort studies suggest that exposure to iodinated contrast agent during pregnancy may lead thyroid dysfunction in offsprings including transient hypothyroidism and goiter. The fetal thyroid is very active during 2nd trimester and a very sensitive to any iodinated agent and increases its uptake. Major side effects are reported when ionic contrast media are administered during pregnancy and even in preconceptional phase in contrary non ionic iodine agents don't affect TSH and T4 level in offspring. The European society of urogenital radiology recommended that neonatal thyroid function should be checked during 1st week of birth if iodinated contrast media was given during pregnancy. Iopamidol is a non-ionic low osmolarity monomeric iodine agent which passes through placenta. It has been demonstrated to be a safe for foetal thyroid functions and reproductive outcome. Ultravist most used iodine based contrast agent in CT is non -ionic, low osmolarity hydrosouluble agent with transplacental passage. One case reported that it is increasing transient TSH level in the newborn when exposed during pregnancy without hormone dysregulation. Use on pregnant women the safety of such media agent is widely evident nevertheless the Lack of clinical studies on humans favours the doubts about use on pregnant women. As far as concerns related to breastfeeding, the iodinated contrast agents are clearly excreted from mother's blood stream within 24 hours and their half life is 2 hours less than 1% of contrast agent is excreted through milk.

Conclusion

In conclusion a mother can safely breastfeed their babies after exposure to an iodine contrast agent, however they can stop breastfeeding for 12-24 hours if they are concerned. In cases where the use of radio diagnostic investigations with a contrast medium is necessary during pregnancy, it is therefore essential to discuss its use with patients, improve the advice given regarding the potential benefits that may occur, and provide them an adequate, informed consent. To date, large prospective studies are actually few in number, so further research should be strengthened to better investigate the risks and benefits of using contrast media in clinical practice and to enable their correct and informed use by physicians.

Keywords: Contrast media; Radio diagnostic; Computed tomography; Pregnant; Ultrasound

Conflict of Interest

None.

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