Neurosurg Rev (2008) 31:351–352
DOI 10.1007/s10143-008-0123-y

LETTER TO THE EDITOR

Radiation exposure during pregnancy

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Received: 14 October 2007 / Accepted: 15 November 2007 / Published online: 6 February 2008

Dear Editor:

We read with interest the review by Marshman et al. [2] about the rare but clinically highly challenging situation of a pregnant woman presenting with an intracranial aneurysm. We agree with the authors that both landmark studies—International Study On Unruptured Intracranial Aneurysms and International Subarachnoid Aneurysm Trial—do not provide data regarding the best individual management for these patients.

Counseling the pregnant patient about the treatment options, of course, has to take into consideration the radiation risk for the fetus implied with endovascular treatment.

In this context, the authors quoted their phantom study and stated that "giving a typical effective dose to the fetus of 4.9 mSv, our results suggested that the risks (for the fetus)…are…orders of magnitude below that which naturally prevails".

We agree with the message that the radiation risk of 4.9 mSv is low and no argument against coiling. This dose is too low to induce malformations, severe mental retardation, or a measurable reduction of intelligence quotient. However, we disagree with the latter part of their statement. We find it potentially misleading, as the reader might conclude that a risk "…orders of magnitude below" the natural risks is irrelevant to influence any decision or even not worth to discuss potential radiation risks of coiling when counseling the pregnant woman.

First of all, the risk of an additional radiation exposure cannot be below but is always on top of the natural risk. In radiation protection, we use the concept that there is no safe lower limit for the stochastic risk of radiation damage, especially for the fetus. The average natural radiation exposure of the abdomen for most of the European population is in the range of 1 mSv/year. Marshman et al. [2] estimate a "typical effective dose to the fetus of 4.9 mSv" (remark: presumably, the authors mean "equivalent dose" because due to the lack of tissue-weighting factors for the fetus, there is no way to calculate an effective dose for the fetus). This dose is not far away from 10 mSv—a dose that has been shown to increase childhood cancer, in particular childhood leukaemia—in a statistically significant manner. The doubling dose of childhood cancer is about 30 mSv based on the analysis of Doll and Wakeford [1]. Under the assumption that the linear-non-threshold concept is applicable, a dose of 4.9 mSv increases the childhood cancer risk by somewhat in excess of 15%. Moreover, the risk of low-dose radiation continues to be a matter of debate and it is not unanimously accepted that this is a negligible dose of radiation.

Radiation exposure during pregnancy is always a sensitive issue with potentially serious personal, social and legal consequences. We should not underestimate the patient's or her relatives' efforts to collect additional information about the risks of the radiation exposure of

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the fetus even long time after coiling. One has to keep in mind that about 5% of all pregnancies end up with a severe malformation of the newborn and frequently, people jump to the conclusion that this was caused by radiation, even if the doses were too low to induce such a malformation.

Therefore, we plead to fully inform the pregnant patient about the radiation risk scenario including the message that there may be a small additional risk for the fetus. As mentioned above, this will not influence our decision what treatment option should be preferred, but it may change the decision of a patient.

We are grateful that this topic is covered by Neurosurgical Review because albeit not frequent, it is highly relevant.

References

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