Ectopic pregnancy in IVF: exploring risks and successes

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What is the problem?

When a pregnancy occurs outside the womb it is called an ectopic pregnancy (EP) (see Figure 1). A ruptured EP can give rise to severe internal bleeding and can sometimes result in the death of the mother. In *in vitro* fertilisation (IVF), the embryo is placed inside the womb by the surgeon so you would not expect this dangerous condition to occur. However, in a small number of cases, EP does still happen. Little is known about which women are most at risk of EP in IVF, or their chances of having a baby if they continue with treatment afterwards.

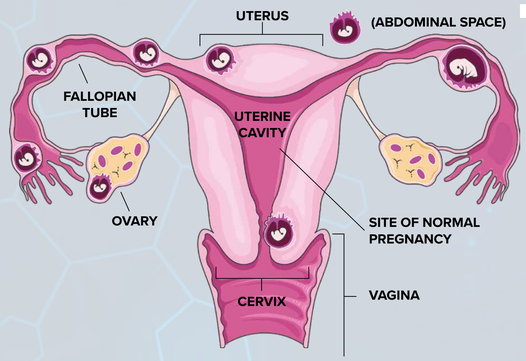

Figure 1 Sites where an ectopic pregnancy may occur. Credit for image, Servier Medical Art by Servier, reproduced and adapted under a Creative Commons Attribution 3.0 Unported licence (https://smart.servier.com/smart_image/ectopic-pregnancy/).

What are we interested in?

We wanted to identify which women are at risk of developing an EP, and to find out the chances of women who have had an EP in their first IVF attempt subsequently having a baby if they continue with treatment.

What did we do?

We sought ethical approval to access records from all IVF treatments in the UK from 1999-2009 which are held by the Human Fertilisation and Embryology Authority (HFEA). The records contain information on every cycle each woman had, including the type of treatment received; intracytoplasmic sperm injection (ICSI) where sperm is injected in to the egg prior to implantation, or standard IVF, where the sperm fertilises the egg 'naturally' in a dish prior to implantation.

We compared the patient characteristics (including age; duration of infertility; cause of infertility; details of the treatment received, including use of IVF vs ICSI, the number of eggs collected and the stage at which embryos were transferred) for women who had babies at their first treatment against those who had an EP. We used statistical modelling to assess the effects of the different patient and treatment characteristics on the chance of having an EP instead of a baby in the first full cycle.

We also investigated the yearly incidence of EP after IVF, and the success rate for having a baby over subsequent full cycles of treatment in couples who had an EP (and no baby) in their first full cycle, compared to those who had a baby in their first full cycle.

What did we find?

We found that between 1999 and 2009, 553 women experienced an EP (and no live birth) and 33081 had a baby in their first full cycle. We also found that the rate of EP fell by 75% over this period (see Figure 2).

As the length of time the couple spent trying to conceive increased, so too did the chance of EP. Women with infertility caused by problems with their fallopian tubes had double the chance of EP than other causes of infertility. We also found that the use of IVF, rather than ICSI, had a significant influence, increasing the chance of EP by 44%.

Compared to those who had a live birth in their first full cycle of treatment, women who had an EP had a lower chance of having a baby over subsequent rounds of treatment (see Figure 3).

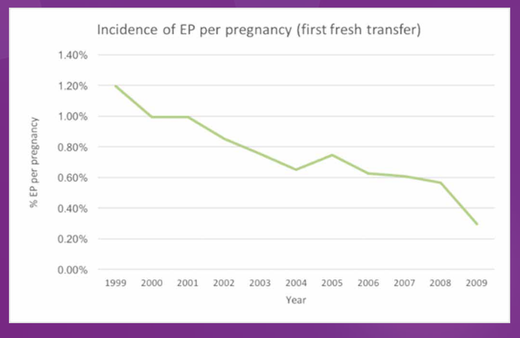

Figure 2 Annual incidence of ectopic pregnancy for women who had any form of pregnancy (either ectopic or normal) in the first attempt.

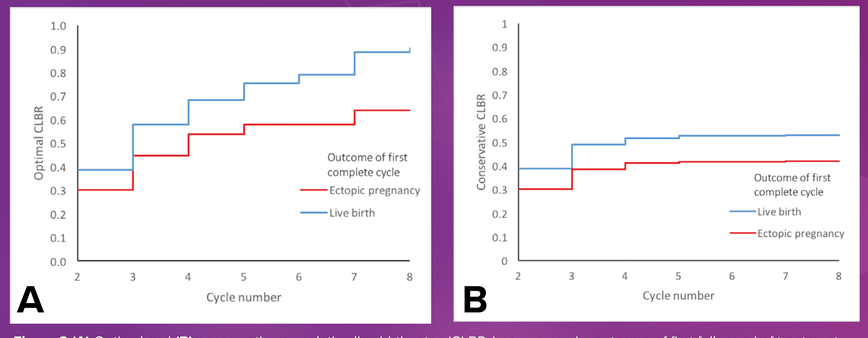

Figure 3 (A) Optimal and **(B)** conservative cumulative live birth rates (CLBRs) per woman by outcome of first full round of treatment. Optimal CLBRs are calculated assuming that both women who continued with treatment and women who dropped out had the same chance of having a baby, while conservative CLBRs assume that women who dropped out of treatment would never have gone on to have a baby.

What does this mean?

Our study supports previous work in women undergoing IVF/ICSI: those with tubal infertility are at an increased risk of EP, and the use of ICSI may offer some protective effect. As EP is a prominent cause of maternal harm and mortality, we hope this information will help improve patient safety by raising awareness of the increased risk of EP in these women. Our study was the first to look at the chance of having a baby over multiple IVF rounds following an EP in the first attempt and our results can be used to help doctors manage their patient's expectations about their chances of future success.

Who am I?

I am a fourth-year medical student at the University of Aberdeen. I have been taking part in research about pregnancy loss in IVF and improving IVF success rates since my second year at medical school, and am currently using my intercalating year in Medical Sciences to continue this work. In the future, I hope to combine research with training as a doctor in obstetrics and gynaecology.

Natalie was supervised during her Vacation Scholarship project, *"Risk factors for ectopic pregnancy in the first complete cycle of in vitro fertilisation"*, by Dr David McLernon and Dr Sohinee Bhattacharya.