Evaluation of the effect of endometriosis on oocyte quality and endometrial environment by comparison of donor and recipient outcomes following embryo transfer in a shared oocyte program

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Summary

Purpose: To determine whether endometriosis has an effect on the uterine environment vs the oocyte itself.

Methods: A retrospective study comparing pregnancy outcome of infertile donors sharing oocytes with donor egg recipients according to whether the donor or recipient had endometriosis or not was carried out.

Results: There were 26 transfers from donors with endometriosis vs 144 in donors without endometriosis. The clinical and viable PRs and implantation rates were 42.9%, 38.1%, and 29.4% for the endometriosis group vs 60.9%, 51.9%, and 33.2%, respectively, for donors without endometriosis (p = NS). The clinical and viable PRs and implantation rates for donors with endometriosis per ET was 41.2%, 35.3%, and 20.4% vs 50.4%, 48.0% and 28.4% for donors without endometriosis, respectively (p = NS).

Conclusions: Though no significant differences were found in donors with or without endometriosis in any parameters, there did appear to be a trend for lower PRs and implantation rates in women undergoing controlled ovarian hyperstimulation.

Key words: Continuous; Donor oocytes; Recipients; Implantation rates.

Introduction

It is not clear if the reduced fecundity observed in patients with endometriosis is due to an adverse effect of endometriosis on oocyte quality or the uterine environment. One method for investigating these two options as possible etiologic factors is using a donor oocyte model.

Several studies have tried this approach. Diaz *et al.* did a case controlled study on the impact of Stage III-IV endometriosis on recipients of sibling oocytes [1]. In this approach, donor oocytes from healthy women were shared between two recipients, one with endometriosis and one without. They found no difference in subsequent pregnancy rates (PRs) and implantation rates. They concluded that implantation is not effected by endometriosis, thus refuting the claim that endometriosis has an adverse effect on uterine environment [1]. Diaz *et al's.* results agree with those found by Sung *et al.* who also found no detrimental effect of endometriosis in oocyte recipients on PRs [2].

However, looking at the donor, Shulman *et al.* in describing the "best donor" in a shared oocyte program, found that the recipient's pregnancy outcome was dependent on the donor's etiology of infertility [3]. Thus, donors with endometriosis and their recipients both showed reduced PRs, thus leading to the conclusion that there is a defect in the oocytes.

Simon *et al.,* also found reduced PR in donors with endometriosis and with their oocyte recipients suggesting that endometriosis has a negative effect on oocyte quality which effects the ability of the embryo to implant [4].

This study investigated this question by considering the PRs in oocyte recipients by whether the donor had endometriosis or not.

Materials and Methods

A retrospective study of all donor oocyte cycles in a five-year period (1/1/97 to 12/31/01) in which the female had a laparoscopy as part of pretreatment screening to determine presence of endometriosis was carried out. All patients were participating in the shared oocyte program. Recipients with known endometriosis were excluded. However many never had a laparoscopy so it was not known if this condition was present or not.

Twenty-six donors during this period had endometriosis and 144 donors did not have endometriosis. All donors were ≤ 35 years old.

Outcome measures included clinical PR per transfer, viable PR per transfer, and implantation rates. Rates were compared by etiology of donor using chi-square analysis; a .05 level of significance was used.

Results

The clinical and delivered PRs and implantation rates in donors and recipients according to whether the donor had endometriosis or not is seen in Table 1. No statistically significant difference was found in clinical or delivered PRs or implantation rates when comparing the

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donors with or without endometriosis or recipients receiving eggs from donors with or without endometriosis (Table 1).

The good implantation rate of 29.4% in recipients receiving oocytes from donors with endometriosis strongly suggests that endometriosis does not adversely affect oocyte quality to any great extent (Table 1). The group with the lowest implantation rate was donors with endometriosis but they still demonstrated a respectable implantation rate (20.4%) (Table 1).

Table 1. — *Outcome in oocyte donors and recipients according to whether the donor had a history of endometriosis.*

	Donor cycles		Recipient cycles	
	Endometriosis	No endometriosis	Donor had endometriosis	Donor did not have endometriosis
Age	30.4 ± 2.7	30.6 ± 3.0	41.0 ± 4.8	42.0 ± 5.8
Avg. # oocytes for each	11.1 ± 4.2	11.2 ± 5.7	11.5 ± 4.3	11.7 ± 5.6
Avg. # embryos transferred	3.1 ± .9	2.9 ± .7	3.2 ± .5	3.3 ± .9
Outcome of fresh transfer				
Clinical PR	41.2% (7/17)	50.4% (64/127)	42.9% (9/21)	60.9% (81/133)
Delivered PR	35.3% (6/17)	48.0% (61/127)	38.1% (8/21)	51.9% (69/133)
Implantation rates	20.4% (11/54)	28.4% (103/363)	29.4% (20/68)	33.2% (144/434)

Discussion

With only 17 fresh transfers in donors with endometriosis and 21 transfers in recipients from donors with endometriosis, one could argue that the study lacked sufficient power to adequately conclude that endometriosis does not have any adverse effect on either oocyte quality or uterine environment.

Looking at trends, the two lowest delivered PRs were seen in donors and recipients receiving oocytes from women with endometriosis (35.3% and 38.1% vs 48.0% and 51.9%). Thus, one could argue that these data are consistent with the conclusions made by previous studies of recipients with endometriosis that this condition must have a mild adverse effect on oocyte quality since the presence of endometriosis did not reduce PRs [1, 2].

However, implantation rates had more power. The implantation rate of 29.4% in recipients from donors with endometriosis compared favorably with the rate of 33.2% in recipients receiving oocytes from donors without endometriosis vs the 28.4% seen in donors without endometriosis. Therefore if one tries to determine even a trend from the demonstrated implantation rates the 20.4% rate seen in donors with endometriosis could suggest that if there is even a mild adverse effect of endometriosis on IVF outcome, it affects uterine environment more than the quality of the oocyte.

There have been some previous data suggesting that the presence of endometriosis may be associated with lower levels of possibly essential integrins needed for successful implantation, e.g., beta-3 integrin [5]. Nevertheless, trends withstanding, reasonably good pregnancy and implantation results can be seen in women with a history of endometriosis.

Thus if endometriosis has any adverse effect on endometrial receptivity or to a lesser degree oocyte quality, the adverse effect seems to be only mild. To demonstrate a significant effect of endometriosis on endometrial receptivity would require a larger cooperative study since it is not likely that any one individual IVF center would have sufficient cases to provide adequate power.

References

[1] Diaz I., Navarro J., Blasco L., Simon C., Pellicer A., Remohi J.: "Impact of Stage III-IV endometriosis on recipients of sibling oocytes: matched case-control study". *Fertil. Steril.*, 2000, *74,* 31.

[2] Sung L., Mukherjee T., Takeshige T., Bustillo M., Copperman A.B.: "Endometriosis is not detrimental to embryo implantation in oocyte recipients". *J. Assist. Reprod. Genet.*, 1997, *14,* 152.

[3] Shulman A., Frenkel Y., Dor J., Levran D., Shiff E., Maschiach S.: "The best donor". *Hum. Reprod.*, 1999, *14,* 2493.

[4] Simon C., Gutierrez A., Vidal A., de los Santos M.J., Tarin J.J., Remohi J., Pellicer A.: "Outcome of patients with endometriosis in assisted reproduction: results from in-vitro fertilization and oocyte donation". *Hum. Reprod.*, 1994, *9,* 725.

[5] Lessey B.A.: "Aberrant integrin expression in the endometrium of women with endometriosis". *J. Clin. Endocrinol. Metab.*, 1994, *79,* 643.

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