The Number of Children Living at Home and the Duration of Embryo Cryopreservation are Significant Risk Factors for Cryopreserved Embryo Abandonment

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LEARNING OBJECTIVES

Participants should be able to:

1. Define cryopreserved embryo abandonment
2. Identify patient characteristics that are associated with an increased risk of human cryopreserved embryo abandonment
Introduction

- Approximately 1/3\textsuperscript{rd} of all in vitro fertilization (IVF) cycles result in excess cryopreserved embryos*
- Approximately 1/3\textsuperscript{rd} of all cryopreserved embryos will be discarded or abandoned**
- Antecedents of embryo abandonment are poorly understood
  - Single small retrospective study (n=11) failed to find any risk factors***

The purpose of this study was to compare patient characteristics of those who abandoned their embryos to those that made other final disposition decisions

*Bangsboll S, et al., 2004, Lyerly AD et al. 2010
**Van Voohis B et al., 1999
***Walsh AP et al., 2010
Embryo Abandonment

● Embryo abandonment defined
  – By what the practice states in the consent & state contract law
    o Non-payment of storage fees and/or
    o Non-communication of disposition decisions
  – After due diligence (phone calls/emails/registered letters) without response, we declared embryos abandoned 90 days from payment due
    o ASRM suggests it is reasonable to discard abandoned embryos after 5 years of no contact*

● Essentially all practices have or will have abandoned embryos
  – Medical-legal concerns
  – Growing problems with practice sales and mergers

*Ethics Committee of ASRM, 2013
Materials & Methods

- Retrospective case-controlled study
- Private reproductive endocrine practice
- Examined those who made cryopreserved embryo disposition decisions from 2007 – 2013, inclusive (N = 182 chart sets)
  - 174 F-M, 4 F-F, 3 singles, 1 M-M
- Parametric & nonparametric statistical analyses
  - t-test, weighted least squares regression
  - ANOVA
  - Chi-square test for independence
  - Power analysis suggested a sample size of 85 would yield an 80% power of finding a significant difference at the alpha = 0.05.
- IRB waiver granted
Materials & Methods (cont.)

- Abandoned, n=44 (24%)
- Other disposition decisions, n=138 (76%, control group)

Distribution of Disposition Decisions:
- Autologous Use: 82 (45%)
- Abandoned: 44 (24%)
- Laboratory: 23 (13%)
- Embryo Donation: 19 (10%)
- Discard: 4 (2%) hESC
132 Data points Examined per Chart Set (Patient/Partner)

- Demographics
- Obstetrical histories
- Surgical histories
- Infertility histories
- Medical/Psychological illnesses
- Financial data
- Embryology data
- Disposition decisions
Did an Increasing Number of Children in The Home Influence the Risk of Embryo Abandonment?

As the number of children in the home increased, so did the risk of embryo abandonment*

\[ r = 0.30, \ t_{161} = 3.920, \ p < 0.0001 \]

![Bar chart showing the proportion of abandoned and non-abandoned children for different numbers of children in the home at the time of the disposition decision.](chart.png)
Did an Increasing Duration of Cryostorage Influence the Risk of Embryo Abandonment?

As the duration of cryostorage increased, so did the risk of embryo abandonment*

For each year of paid cryostorage fees, the risk of embryo abandonment increased by 7.8%

(F_{1,8}=74.17, R_{adj}^2=.89, p<.0001)

*(r=0.23, t_{180}=3.15, p=0.0009)
Did the Debt Owed to The Practice Increase the Risk of Embryo Abandonment?

Patients that abandoned their embryos owed significantly more cryopreservation and overall debt to the practice ($r=0.23$, $t_{180}=3.21$, $p=0.008$)
Did the Patient’s Completed Education Level Influence the Risk of Embryo Abandonment?

The patients with the lowest education level were significantly more likely to abandon their embryos*  

*(r=-0.19, t_{162}=2.46, p=0.007)
Did Insurance Coverage Influence The Risk of Embryo Abandonment?

40/162 (25%) of the patients had partial/complete IVF insurance coverage.

Patients who had partial/complete IVF insurance coverage were significantly more likely to abandon their embryos ($r=0.15$, $t_{162}=1.87$, $p=0.032$).
Patients with a diagnosis of tubal/peritoneal or endometriosis were significantly more likely to abandon their embryos ($X^2_3=8.74$, $p=0.032$)
Did the Number of Cryopreserved Embryos Influence the Risk of Embryo Abandonment?

The risk of embryo abandonment significantly increased as number of cryopreserved embryos increased ($r=0.13$, $t_{180}=1.74$, $p=0.042$)

![Bar chart showing the proportion of abandoned and non-abandoned embryos for different ranges of cryopreserved embryos.](chart.png)
Discussion

- Numerous antecedents of embryo abandonment were identified
- Rationale to each of the findings is suggested:
  - With additional children in the home, goals may have been fulfilled and discretionary income unavailable
  - The longer the duration of storage, it was likely that patients were conflicted regarding their disposition decision
  - If debt was owed to the practice, perhaps they were embarrassed and/or unable to reimburse
  - Those with a less education may have viewed their embryos differently or did not have the income to perform a FET
Discussion

● Rationale (cont.):
  – Perhaps patients with IVF insurance coverage may not have the same emotional investment in their cryopreserved embryos
  – Those patients with tubal/peritoneal or endometriosis diagnoses may have been “burned out” because of symptoms and/or surgeries
  – As the number of cryopreserved embryos increased, the patients may have felt overwhelmed with their disposition decision

● Interview those that abandoned to understand their reasons

● With these risk factors, perhaps future intervention will guide patients to consider other disposition decisions

● Prospective longitudinal study suggested
Study Weaknesses & Strengths

● Weaknesses
  – Retrospective study
    o Incomplete charts/information
  – Single physician private practice
  – Non-mandated state

● Strengths
  – Largest study to date with many data points examined
  – Practical applications (i.e., patient data available to most IVF practices)
  – Statistical findings very significant
Conclusions

- Abandoned embryos present logistical, ethical and legal dilemmas
- The following risk factors were correlated with an increased risk of cryopreserved embryo abandonment
  - More children in the home
  - Prolonged cryostorage
  - Increasing debt to the practice
  - Lower education level
  - Partial/complete IVF insurance coverage
  - Primary diagnosis of tubal/peritoneal or endometriosis
  - Increasing number of embryos cryopreserved

For each year of paid cryostorage fees, the risk of embryo abandonment increased by nearly 8%
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