PRIMARY INFERTILITY RESULTING FROM OOCYTE MATURATION ARREST: A CASE REPORT

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BACKGROUND

- Oocyte maturation arrest (OMA), characterized by abnormal meiosis and failure of polar body formation, was first linked to infertility in 1990 during in-vitro-fertilization (IVF) [1].
- Most cases remain unsolved, though scarce literature includes rare pathogenic variants in *TRIP13* and mechanisms that may contribute to its etiology [2-4].

OBJECTIVE

- To present a case of primary infertility with repeated M1 oocyte arrest and use of experimental in-vitro maturation (IVM) culture media to mature oocytes in-vitro.

MATERIALS & METHODS

Patient Background:

- 39 years old North African nulligravida with 14 years of infertility
- Two IVF cycles at different centers
- Donor oocyte precluded by religious beliefs

MATERIALS & METHODS

First IVF Cycle (2013, Age 28, Georgia, USA):

- Protocol: Long Lupron with Follistim 200 IU / Menopur 75 IU
- Stimulation day 11, Peak Estradiol (E2): 7850 pg/mL
- hCG trigger, Oocyte retrieval at 36 hours
- Outcome: 12 M1 oocytes
  - 8 conventional IVF; 4 denuded and none mature for ICSI
  - All oocytes remained unchanged at M1 stage

Second IVF Cycle (2016, Age 31, Jordan):

- AMH: 4.8 ng/mL
- Antagonist protocol, no information on gonadotropin dose
- hCG trigger 10,000 units
- Oocyte retrieval at 36 hours
- Outcome: 22 oocytes (19 M1, 2 GV, 1 FZ)

Third IVF Cycle (2023, Age 39, Georgia, USA):

- AMH: 1.6 ng/mL
- TRIP13 Sequence analysis and deletion/duplication testing: negative
- Protocol: Microdose Lupron, Follistim 375 IU / Menopur 150 IU
- Prolonged stim to day 14, 7 follicles >20mm, Peak E2: 4076 pg/mL
- Ovidrel trigger
- Oocyte retrieval 36 hours later
- Outcome: 11 oocytes (9 M1, 1 GV, 1 FZ)
- Experimental in-vitro maturation (IVM) culture media: 9 M1s and 1GV

Experimental IVM Culture Media:

- Prepared 1 day before retrieval using the Medicult IVM System
- 3 mL LAG Medium (Vial 1) and 10 mL IVM Medium (Vial 2) pre-equilibrated in CO_2 at 37°C for ≥12 hours

Process:

- Retrieved oocytes stored in LAG Medium for 2-3 hours
- Transferred to IVM Maturation Medium containing:
  - 9 mL IVM Medium, 1 mL patient's serum, 10 µL hCG solution, 100 µL FSH
- Incubated in IVM Medium for 48 hours

RESULTS

- Oocytes were incubated in IVM medium and evaluated at 24, 28, and 48 hours in culture.
- All oocytes remained MI (Fig 2)

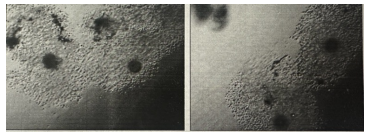

Figure 1: Oocytes at retrieval

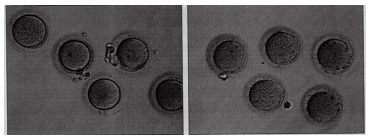

Figure 2: 9M1 + 1 GV oocytes after 48hrs in IVM Culturing remain immature

CONCLUSION

- Despite 14 years of infertility, 3 IVF cycles, no *TRIP13* pathogenic variant, and a trial of IVM, the patient has primary infertility due to abnormal meiosis causing oocyte maturation arrest at the MI stage.
- A possible etiology of oocyte maturation arrest includes a genetic component.
- We are performing genome sequencing to further understand the pathogenesis of oocyte maturation.

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