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Research Article

Microbial Infections in IVF Culture System and Recovering Infected Embryos

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Abstract

Bacterial contamination may cause loss or damage to cultured oocytes or embryos, resulting in the cancellation or delaying of a fresh embryo transfer, Other worrisome consequences include DNA fragmentation, poor-quality embryos, early pregnancy loss or preterm birth, While live births have been reported following the transfer of embryos contaminated with yeast, very little information is available on how to handle embryos with bacterial contamination Since IVF procedure is very expensive, in most of the cycle the infected embryos culture dish is discarded which causes big loss for patients who underwent IVF cycle apart from this, a patient undergoes a lot of financial and emotional stress which in turn impact negative remarks for IVF centre.

The aim of this research is to find a suitable procedure to decontaminate the infected culture system and recover back infected embryos into healthy embryos which are suitable for Embryo transfer to patients further aiming for a successful pregnancy.

Keywords: Recovering Embryos; Infections; Antibiotics; Embryology Lab; IVF Culture System

Introduction

Bacterial contamination may cause loss or damage to cultured oocytes or embryos, resulting in the cancellation or delaying of a fresh embryo transfer, Other worrisome consequences include DNA fragmentation, poor-quality embryos, early pregnancy loss or preterm birth, While live births have been reported following the transfer of embryos contaminated with yeast, very little information is available on how to handle embryos with bacterial contamination Since IVF procedure is very expensive, in most of the cycle the infected embryos culture dish is discarded which causes big loss for patients who underwent IVF cycle apart from this, a patient undergoes a lot of financial and emotional stress which in turn impact negative remarks for IVF center.

The aim of this research is to find an suitable procedure to decontaminate infected culture system and recover back infected embryos to healthy embryos which are suitable for Embryo transfer to patient further aiming for successful pregnancy.

Materials and Methods

This is the first study to address the long-term evaluation of microbial contamination of culture dishes in an ART laboratory.

A patients who underwent IVF had infected culture dish during their embryonic culture post oocytes retrieval. The infected dish were sent for microbial analysis to identify the microorganism which are then subjected to ETEST with different antibiotic to identify the source of contamination. Until the Microbial Specific Antibiotic (MSA) is identified embryos are subjected to standard Broad Spectrum Antibiotics (BSA) for recovery. Once the MSA are identified embryos were tried to cultured for successful recovery.

This is the first study to address the long-term evaluation of microbial contamination of culture dishes in an ART laboratory. patients who underwent IVF had infected culture dish during their embryonic culture post oocytes retrieval. The infected dish were sent for microbial analysis to identify the microorganism which are then subjected to ETEST with different antibiotic to identify the source of contamination. Until the Microbial Specific Antibiotic (MSA) is identified embryos are subjected to standard Broad Spectrum Antibiotics (BSA) for recovery. Once the MSA are identified embryos were tried to cultured for successful recovery. This is in case of infection seen on day 1 of the culture, in case if the infection is seen on day 3 to day 5 embryos are frozen and cultured later since the microbial culture reporting takes 24 to 48 hrs from an diagnostic centers. If the results are obtained in 24hrs the researching is continued.

Results and Discussion

Amphotericin B/Streptomycin

8 out of 11 instances are dealt with successfully by this. It shown efficacy against 7 candida species and 1 staphylococcus species, al-

though 1 *E. coli*, 1 staphylococcus, and 1 candida strain displayed resistance. Amphotericin/Streptomycin was 64% effective against fungal strains.

Cefixime

7 out of the 9 situations this applies to are successfully. It shown activity against 2 staphylococcus species and 7 *E. coli* species, however 2 E. coli strains exhibited resistance. showed 77% effectiveness against *E. coli* strains

Sulfamethaxazole/Trimethoprim

14 of the 16 instances it applies to are successfully. It shown activity against 12 Achroxylosoxidans, 1 staphylococcus species, and 1 streptococcus species; nevertheless, resistance was found in 1 staphylococcus strain and 1 streptococcus strain.

The effectiveness of Sulfamethaxazole/Trimethoprim against Achro. xylosoxidans was 75%.

In general, Peter M. reported 0.23 percent to 0.35 percent microbial contamination, while Ben-Chetrit reported 0.69 percent. I gathered information between 2014 and 2023 from Neelkanth Fertility in Udaipur, ARC Fertility in Chennai, Motherhood Fertility in Bangalore, Foetal Medicine Center in Trichy, Manohari Fertility in Tirupathi, Guna Fertility in Lalgudi, Kangaroo Fertility in Bangalore, Momsoon Fertility in Bangalore, Sadguna Fertility in Anantpur, Varam Fertility in Hosur The contamination ratio exceeded international limits, which may be a result of flaws in the IVF laboratory's standard operating procedures (SOP), as well as insufficient quality control in the environment, consumables, staff, and other areas. IVF cycles exhibited significant infection rates despite very little contamination in ICSI cycles; this is because to aseptic lab maintenance and egg-picking techniques used in IVF. The preparation of the sperm, on the other hand, may be to blame. In contrast to the traditional IVF technique, ICSI only requires the selection of one sperm for each egg to fertilise, which makes it simpler to prevent contamination with microorganisms from semen.

However, removing cumulus granulosa cells, hyaluronidase, and repeated washing procedures before to the ICSI method may help in viral decontamination for porcine embryos developed *in vitro* avoiding contaminations from the oocytes. In some situations, contamination affected just some of the embryos created by *in vitro* Fertilization, while in others, it affected all embryos created through IVF and ICSI together. In the latter instance, however, the bacteria were only detected in the culture media and the semen, suggesting that the ICSI component was tainted during the first IVF Fertilization. Furthermore, recurrent contaminations only occurred in IVF embryos even when two couples had several oocyte extraction cycles using different Fertilization procedures for each cycle. Therefore, we hypothesised that the ICSI method may be employed to successfully prevent embryonic contamination in culture plates during IVF cycles.

Conclusion

Its very difficult to know which microbes caused the infection every second is important as the embryos are growing in the culture system as an embryologist we must act immediately so that the microbes doesn't take control of the embryos by altering embryos morphokinetics and I believe strongly that the microbial infections depletes the genetics stabilities of the developing embryos. Once infection is seen regular monitoring is very important when Antibiotic 1 fails to work which used in this study switch on to the 2nd Antibiotic if not the 3rd until we find which is the microbes that is actually causing the infection. Since Sulfamethaxazole/Trimethoprim and Amphotericin B/Streptomycin combination antibiotic showed very efficient in controlling the infection level this 2 Antibiotics can be considered as 1st preference of choice. Not all the time the recovering of the embryos are successful there is a risk of embryos degeneration exposing to antibiotics sometimes. Further more studies are needed in order to evaluate the influence of microbes on morphogenetics of the embryos

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Conflict of Interest

Embryologists have a difficult task of trying to maintain a sterile environment while at the same time trying to protect the embryos from a toxic or inhospitable environment. Some of the methods we employ to keep the environment aseptic may exacerbate other problems resulting in lower embryo viability. For example, a hood used to maintain a sterile air flow may cause inadvertent changes in the osmolality of small micro drops, especially in a dry climate. This increased osmolality might result in osmotic stress either decreasing viability of the embryos or even making some degenerate. The improper use of hoods may even increase the chances for contamination if there are non-sterile items in the hood interrupting the flow of sterile air and causing that contaminated air to flow across sterile dishes or drops.

Every year about 2 - 5 percent of infection are common in an IVF center during embryonic *in-vitro* culturing in-spite of following stringent aseptic protocols. The infected embryos are either not recovered or sometimes embryos dies because of the severity of infections. What ever the causes hospital and doctors are answerable for the couples under going IVF treatment, its very difficult to convince patient for not having any embryos for transfer, cost they spent and most of all mental trauma which they undergo when we say the entire ivf treatment cycle ended up failure.

This research contributes ivf centers and embryologist to try recovering infected embryos and convert the failed ivf cycle to successful Embryo Transfer.

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