International Journal of Gynecology and Obstetrics xxx (2015) xxx–xxx

Contents lists available at ScienceDirect

International Journal of Gynecology and Obstetrics

journal homepage: www.elsevier.com/locate/ijgo

www.figo.org

REVIEW ARTICLE

Impact of endometrial cavity fluid on assisted reproductive technology outcomes

Shan Liu [a,1], Lin Shi [b,1], Juanzi Shi [a,*]

[a] Assisted Reproduction Center, Northwest Women's and Children's Hospital, Xi'an, China
[b] Department of Immunology and Microbiology, Xi'an Jiaotong University Health Science Center, Xi'an, China

ARTICLE INFO

Article history:
Received 4 April 2015
Received in revised form 12 July 2015
Accepted 20 November 2015

Keywords:
Assisted reproductive technology
Endometrial cavity fluid
Hydrosalpinx
Meta-analysis
Pregnancy rate

ABSTRACT

Background: The impact of endometrial cavity fluid (ECF) on assisted reproductive technology (ART) outcomes has not been evaluated in a meta-analysis. *Objectives:* To evaluate the impact of ECF on the outcome of ART cycles. *Search strategy:* PubMed, China Academic Journals Full-text Database, and China Doctoral/Masters Dissertations Full-text Databases were searched for reports published in any language before January 1, 2015, using relevant keywords. *Selection criteria:* Studies were included if they compared the outcome of ART in women with and without ECF. *Data collection and analysis:* Background information, participants' characteristics, and study outcomes were recorded. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated using the Mantel–Haenszel method. *Main results:* Six studies evaluating 5928 ART cycles were included. The pregnancy rate was significantly lower in the group with ECF than in the group without ECF (OR 0.74, 95% CI 0.55–0.98; $P = 0.03$). The same association was observed if the analysis included only patients with hydrosalpinx (OR 0.36, 95% CI 0.15–0.86; $P = 0.02$). *Conclusions:* The clinical pregnancy rate after ART is significantly lower among patients with ECF than among those without ECF. In addition, if ECF is found in patients with hydrosalpinx, ART cycles should be cancelled after oocyte retrieval.

1. Introduction

The term endometrial cavity fluid (ECF) refers to fluid that accumulates in the uterine cavity. The fluid can consist of blood, mucus, endometrial secretions, and/or tubal fluid. The origin of ECF is controversial, but it is associated with hydrosalpinx, over-reactive fluid generation in response to gonadotropin therapy, subclinical uterine infections, and obstruction of the cervical canal after human chorionic gonadotropin (hCG) administration [1–3]. Sporadically, fluid accumulation can be detected through ultrasonography during assisted reproductive technology (ART) cycles. A few case studies [3–8] reported the presence of ECF during ovarian stimulation, after hCG administration and before embryo transfer. Subsequently, several retrospective cohort studies [1,2,9–12] examined the impact of ECF on ART outcome. In these studies, the frequency of ECF ranged from 3.0% to 8.2%, but there was no agreement on the impact of ECF on the clinical pregnancy rate. Although a short review on this topic has been published [13], no meta-analysis is available that has evaluated the factors contributing to the development of ECF and the impact that ECF has on ART outcomes.

Several ECF-related variables could have an effect on the outcome of ART, including the etiologic factor underlying ECF formation, the timing of ECF development, and the amount of ECF. Treatment of ECF should be individualized on the basis of these variables. To clarify the impact of ECF-related variables on the outcome of ART, the present literature review and meta-analysis were conducted.

2. Materials and methods

2.1. Information sources

PubMed, the China Academic Journals Full-text Database, the China Doctoral Dissertations Full-text Database, and the China Masters' Theses Full-text Database were searched. The searches were not limited by language or publication status. The databases were searched for reports published before January 1, 2015.

2.2. Search strategy

The following terms were used and adjusted for each database as necessary: "(endometrial cavity fluid) OR (endometrial fluid) OR (fluid accumulation of the uterine cavity) OR (endometrial fluid accumulation) OR (fluid accumulation within the uterine cavity) OR (fluid within the endometrial cavity) OR (endometrial fluid collection)"; and "((fluid accumulation) OR (fluid collection) OR fluid)) AND ((uterine

* Corresponding author at: Northwest Women's and Children's Hospital, No. 73 HouZaiMen Street, Xi'an, 710003, China. Tel.: +86 29 87219120; fax: +86 29 87275875.
E-mail address: shijuanzi123@126.com (J. Shi).
[1] These authors contributed equally.

http://dx.doi.org/10.1016/j.ijgo.2015.07.037
0020-7292/

cavity) OR endometrial)) AND (ART OR IVF OR embryo)". Additionally, the reference lists from included studies and relevant reviews were hand-searched.

2.3. Study selection

The titles and abstracts were reviewed independently by two authors (S.L. and J.S.), who checked for duplicates and applied the pre-established criteria for inclusion. Studies were eligible for inclusion if they compared the outcome of ART in women with and without ECF. Any discrepancies between the two reviewers on the eligibility of a study were resolved by discussion until a consensus was reached.

2.4. Data abstraction and quality assessment

Two authors (S.L. and J.S.) independently extracted the data, and disagreements were solved by consultation with the third author (L.S.). Background information, participants' characteristics, and study outcomes were recorded. The primary study outcome was the clinical pregnancy rate per embryo transfer.

To assess the study quality, the same two investigators independently applied the Newcastle–Ottawa Assessment Scale [14] and assigned a quality score of 0–9 to each study, with the maximum score representing the highest methodological quality. The score was calculated on the basis of the selection of the study participants (0–4 points), the quality of the adjustment for confounding (0–2 points), and the ascertainment of the outcome of interest (0–3 points).

2.5. Data synthesis

The data were analyzed with RevMan 5.2.7 (Cochrane Collaboration, Oxford, UK). Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated using the Mantel–Haenszel method for binary variables. Heterogeneity between the study populations was evaluated using Cochran's Q statistic and quantified by calculating I^2 [15]. If there was no heterogeneity, meta-analysis of the pooled data was performed using a fixed-effects model. If there was substantial heterogeneity ($P < 0.1$ using the χ^2 test or $I^2 > 50\%$), the random-effects model was used [16]. The meta-analysis results were displayed graphically using forest plots. Because of the small number of studies included in the meta-analysis, publication bias could not be examined with a funnel plot.

3. Results

3.1. Included studies

The systemic literature search identified 579 studies related to the presence of ECF during ART (Fig. 1). Six studies [1,2,9–12] evaluating a total of 5928 ART cycles were included in the meta-analysis (Table 1). All included studies were retrospective.

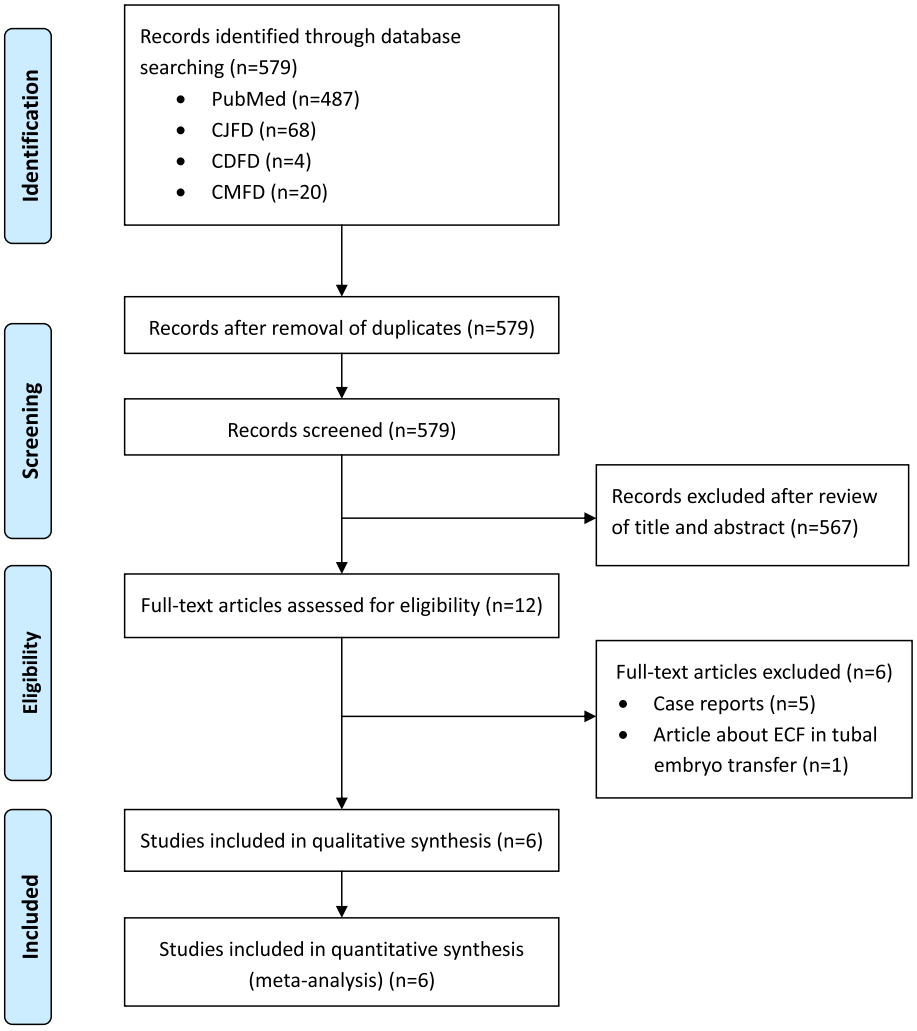

Fig. 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow chart. Abbreviations: CJFD, China Academic Journals Full-text Database; CDFD, China Doctoral Dissertations Full-text Database; CMFD, China Masters' Theses Full-text Database; ECF, endometrial cavity fluid.

Please cite this article as: Liu S, et al, Impact of endometrial cavity fluid on assisted reproductive technology outcomes, Int J Gynecol Obstet (2015), http://dx.doi.org/10.1016/j.ijgo.2015.07.037