

# Oocyte recovery rates in flushing versus nonflushing during oocyte retrieval in assisted reproductive techniques

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## Abstract

Follicular aspiration under transvaginal ultrasound guidance is performed as part of assisted reproductive technology (ART) to retrieve oocytes for *in vitro* fertilization (IVF). However, controversy as to whether follicular flushing following aspiration yields a larger number of oocytes than aspiration only is ongoing. The aim of this study was to assess the safety and efficacy (oocyte recovery rates) of follicular flushing when compared with aspiration only performed in women undergoing ART. The study was conducted at Sir Gangaram Hospital, New Delhi. Retrospective data of 100 females undergoing ART was taken from September 2019 to September 2020. Patients were divided into two groups of 50 each. In first group, patients underwent oocyte retrieval using double lumen needle (flushing technique) and in the second group, single lumen needle (no flushing) were used. Females with age  $\leq 37$  years who were having  $\leq 9$  follicles, size  $\geq 14$  mm during oocyte retrieval when undergoing ARTs. Categorical variables were presented in number and percentage (%) and continuous variables, as mean  $\pm$  standard deviation and median. Normality of data was tested by Kolmogorov–Smirnov test. If the normality was rejected, then nonparametric test was used. Quantitative variables were compared using Mann–Whitney test. Follicular flushing had significantly better oocyte recovery rates when compared with no flushing ( $P < 0.05$ ). There was no significant difference ( $P > 0.05$ ) in M2 rates in patients undergoing intracytoplasmic sperm injection (ICSI) when compared in both the groups. There was no significant difference ( $P > 0.05$ ) in fertilization rates in patients undergoing IVF and ICSI, respectively, in both the groups. Double lumen needle with flushing technique gives better oocyte recovery rates in low responder women undergoing ARTs. Hence, follicular flushing may be considered in such patients for oocyte retrieval.

**Keywords:** ART, COS, flushing, nonflushing, oocytes


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## INTRODUCTION

Follicular aspiration under transvaginal ultrasound guidance is performed as part of assisted reproductive technology (ART) to retrieve oocytes for *in vitro* fertilization (IVF). However, controversy as to whether follicular flushing following aspiration yields a larger

number of oocytes than aspiration only is ongoing. Flushing of follicles was a routine procedure in IVF treatments at the beginning of ultrasound-guided follicular aspiration.<sup>[1]</sup> The purpose of the flushing procedure was to increase oocyte yield, possibly by improved detachment of the cumulus–oocyte complex

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(COC) from the follicular wall. However, several studies have shown that follicular flushing neither increased oocyte yield nor pregnancy rate per cycle, in patients with a normal response to gonadotropin stimulation.<sup>[2]</sup> However, in poor responder patients, the benefit of follicular flushing has been a subject of controversy.<sup>[3]</sup> One randomized controlled trial (RCT) has reported increased oocyte yield following follicular flushing in poor responders.<sup>[4]</sup> On the contrary, another study has found no benefits of follicular flushing for increasing oocyte yield.<sup>[5]</sup> Nevertheless, various studies have suggested that the number of oocytes is an important prognostic variable for IVF success, that is, live-birth rate (LBR), hence the need to retrieve maximum oocytes during IVF.<sup>[6,7]</sup> Therefore, we undertook this study to evaluate the benefit of flushing, if any, on oocyte yield.

The aim of the study was to assess the efficacy (oocyte recovery rates) of follicular flushing when compared with aspiration only in low responder women undergoing controlled ovarian stimulation (COS) during ARTs.

## MATERIALS AND METHODS

The study was conducted at Centre of IVF & Human Reproduction, Sir Gangaram Hospital, New Delhi. It was a retrospective observational study. The study included patients undergoing COS with IVF from September 2019 to September 2020. Total 671 patients underwent COS with IVF during this period. After fulfilling the selection criteria, the first 50 low responders who underwent oocyte retrieval using no follicular flushing technique (with single lumen needle) formed the first group and the first 50 low responders who underwent oocyte retrieval using follicular flushing technique (with double lumen needle), formed the second group. In flushing technique, follicles were flushed with 1 ml media after aspiration and the media was reaspirated. Normally single lumen needle is used for oocyte retrieval at our center, but in poor responders double lumen needle is used for flushing follicles. The data of these 100 patients were analyzed in the study. In the first group, 33 patients underwent intracytoplasmic sperm injection (ICSI) and 17 patients underwent IVF. In the second group, 31 patients underwent ICSI and 19 patients underwent IVF.

### Selection criteria

Females with age  $\leq 37$  years, having  $\leq 9$  follicles  $\geq 14$  mm during oocyte retrieval while undergoing ARTs.

### Exclusion criteria

Females  $>37$  years of age and females showing normal response to COS during IVF.

### Statistics

Categorical variables were presented in number and percentage (%) and continuous variables were presented as mean  $\pm$  standard deviation and median. Normality of data was tested by Kolmogorov–Smirnov test. If the normality was rejected, then nonparametric test was used. Quantitative variables were compared using Mann–Whitney test (as the data sets were not normally distributed) between the two groups. A *P*-value of  $<0.05$  was considered statistically significant. The data were entered in MS EXCEL spreadsheet and analysis was carried out using Statistical Package for Social Sciences (SPSS) version 21.0 (Statistical package for social sciences (SPSS) software, IBM manufacturers, Chicago, USA).

### Outcomes

Primary outcome measures: oocyte recovery rates.

Secondary outcomes measures: M2 rates, fertilization rates in IVF and ICSI.

Oocyte recovery rate (%) =  $\frac{\text{Number of oocytes}}{\text{Numbers of aspirated follicles}} \times 100$

M2 rates (%) =  $\frac{\text{M2 oocytes}}{\text{Total retrieved oocytes}} \times 100$

Fertilization rate in IVF (%) =  $\frac{\text{Total 2 pronuclei (pn)}}{\text{Total retrieved oocytes}} \times 100$

Fertilization rate in ICSI (%) =  $\frac{\text{Total 2 pn}}{\text{Total injected oocytes}} \times 100$

## RESULTS

Tables 1–4 illustrate that oocyte recovery rates were significantly better when flushing technique was used when compared with nonflushing during oocyte retrieval. There was no statistically significant difference in M2 rates, fertilization rates in IVF, and fertilization rates in ICSI.

## DISCUSSION

In our study, it was observed that flushing improved oocyte yield in low responder women undergoing COS during IVF. In low responders, even a single oocyte is precious. Flushing helps in detachment of COC from follicular wall. Hence, no follicle is left wasted.

**Table 1: Comparison of oocyte recovery rate (%) using nonflushing or flushing of follicles**

	No follicular flushing	Follicular flushing	P-value
	<i>n</i> = 50	<i>n</i> = 50	
Mean follicles	7.32 ± 2.18	5.52 ± 2.21	0.04
Mean oocytes	5.96 ± 2.31	4.88 ± 2.31	
Oocyte recovery rates (%)			
Mean	80.12 ± 20.25	85.48 ± 23.55	
Median	84.72 (66.67–100)	100 (80.832–100)	

**Table 2: Comparison of M2 rate (%) using nonflushing or flushing of follicles**

M2 rates (%)	No follicular flushing	Follicular flushing	P-value
	<i>n</i> = 33	<i>n</i> = 31	
Mean ± SD	73.03 ± 22.9	78.54 ± 23.09	0.364
Median (IQR)	77.78 (71.43–85.71)	80 (69.05–100)	

IQR, interquartile range; SD, standard deviation.

**Table 3: Comparison of fertilization rate (%) using nonflushing and flushing of follicles in *in vitro* fertilization**

Fertilization rates (%)	No follicular flushing	Follicular flushing	P-value
	<i>n</i> = 17	<i>n</i> = 19	
Mean ± SD	66.74 ± 25.76	68.7 ± 32.29	0.736
Median (IQR)	66.67 (60–80)	71.43 (58.57–100)	

IQR, interquartile range; SD, standard deviation.

**Table 4: Comparison of fertilization rate (%) using nonflushing and flushing of follicles in intracytoplasmic sperm injection.**

Fertilization rates (%)	No follicular flushing	Follicular flushing	P-value
	<i>n</i> = 33	<i>n</i> = 31	
Mean ± SD	70.37 ± 30.5	72.94 ± 28.88	0.518
Median (IQR)	83.33 (50–100)	83.33 (50–100)	

IQR, interquartile range; SD, standard deviation.

One RCT demonstrated that this approach did not improve oocyte yield instead led to a 32% longer operation time.<sup>[8]</sup> Two other RCTs were also consistent with the above study, as none of these found an increased oocyte yield by flushing the follicles.<sup>[4,9]</sup> Cochrane review<sup>[10]</sup> also supports the above findings. In contrast, two large retrospective studies revealed a higher number of oocytes if follicles were flushed.<sup>[11,12]</sup> One RCT concluded that flushing of follicles at the time of oocyte retrieval was of benefit in women with poor response to controlled ovarian stimulation (COS) in terms of higher number of oocyte recovery and therefore a greater number of embryos available for transfer. Even though the procedure and anesthesia time were longer, it was worth flushing follicles in women with poor response to COS for better LBRs and significantly improved clinical pregnancy rates.<sup>[13]</sup> In yet another study, it was seen that age adjusted

cumulative LBR (CLBR) was strongly influenced by oocyte number, with CLBR significantly increasing with increase in oocyte yield. To increase LBR/CLBR, we need to maximize the number of oocytes.<sup>[14]</sup> Considering oocyte numbers as an important marker for IVF outcomes, flushing is a simple and effective technique to increase oocyte yield especially in poor responders.

#### Limitation

The M2 rates were calculated only in ICSI cycles. The study had a small sample size and it was a retrospective study.

#### CONCLUSION

To conclude, it appears that flushing increases oocyte yield in low responder women undergoing COS for IVF and

can be considered in these women as a reasonable method for better oocyte yield.

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### Conflicts of interest

There are no conflicts of interest.

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