

The Effectiveness and Safety of Transabdominal Oocyte Pick up Using a Vaginal Ultrasound Probe in Patients with Endometrioma Undergoing Oocyte Cryopreservation

Oosit Kriyoprezervasyon Amacı IVF Yapılan Endometriomali Bekar Kadınlarda Vajinal Ultrason Probu ile Transabdominal Oosit Toplanması Etkinliği ve Güvenliği

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ABSTRACT

Objective: To assess whether transabdominal oocyte pick up is safe and effective in single patients with endometrioma undergoing IVF for the purpose of oocyte cryopreservation. **Materials and Methods:** In this retrospective cohort study 13 virgin patients with endometrioma who underwent transabdominal oocyte pick-up for the purpose of oocyte cryopreservation was analyzed. Demographic characteristics, and hormonal assessment including AMH, day 3 serum FSH, LH, estradiol and progesterone levels, and antral follicle counts were recorded. Primary outcome measures were number of oocytes retrieved, metaphase 2 oocytes frozen, follicle oocyte index, and complication rates, while secondary outcome measures were duration of stimulation, cumulative gonadotropin dose, and duration of the procedure. **Results:** The mean age of patients was 32,7±8,5. The mean diameter of the endometrioma was 48,1±23,6 mm, antral follicle count was 6,02±2,92, serum AMH was 0.62±0.32 ng/ml, and day 3 serum FSH and estradiol were 9,3±2,4 IU/ml and 60,0±28,6 pg/ml respectively. The mean duration of stimulation was 8,5±1,98 days, cumulative gonadotropin consumption was 1659±546 units, and duration of the procedure was 8.3±3.9 min. The mean number of oocytes retrieved was 5,5±3.1, oocytes frozen was 4,15±2.23, and mean modified follicle oocyte index was 0,93±0,17. No major complication occurred in any of the patients; however, one patient was temporarily hospitalized for six hours for severe pelvic pain. **Conclusions:** Transabdominal oocyte pick up is safe and effective procedure in single patients with endometrioma undergoing IVF for the purpose of oocyte cryopreservation.

Keywords: Cryopreservation; endometriosis; oocyte retrieval

ÖZET

Amaç: Endometrioması olan bekar kadınlarda oosit kriyoprezervasyon amacı ile yapılan IVF’te transabdominal oosit toplanmasının etkinliği ve güvenliğini araştırmak. **Gereç ve Yöntemler:** Bu retrospektif kohort çalışmada endometrioması olan 13 bekar hastada oosit kriyoprezervasyonu amacı ile transabdominal oosit toplanmasının etkinliği ve güvenliği araştırılmıştır. Hastaların demografik özellikleri, serum AMH değeri, 3. gün serum FSH, LH, estradiol ve progesteron değerleri ile antral folikül sayıları kayıt edilmiştir. Çalışmanın ana amacı olarak toplanan oosit sayısı, metafaz 2 oosit sayısı, folikül-oosit indeksi ve komplikasyon oranları belirlenirken, ikincil amaç olarak ise stimülasyon süresi, toplam kullanılan gonadotropin miktarı ve işlem süresi olarak belirlenmiştir. **Bulgular:** Çalışmaya dahil edilen hastaların ortalama yaşı 32,7±8,5 olarak hesaplandı. Ortalama endometrioma boyutu 48,1±23,6 mm, ortalama serum AMH düzeyi 0.62±0.32 ng/ml, 3. gün serum FSH düzeyi 9,3±2,4 IU/ml, serum estradiol düzeyi 60,0±28,6 pg/ml ve ortalama antral folikül sayısı 6,02±2,92 olarak hesaplandı. Ortalama değerler olarak; simülasyon süresi 8,5±1,98, toplam kullanılan gonadotropin miktarı 1659±546 ünite, ortalama işlem süresi 8.3±3.9 dk., toplanan oosit sayısı 5,5±3.1 ve dondurulan olgun oosit sayısı 4,15±2.23 olarak saptandı. Ortalama folikül oosit indeksi ise 0,93±0,17 olarak hesaplandı. Hastaların hiçbirinde majör bir komplikasyon oluşmadı, sadece bir hastada 6 saatlik hastane yatışı gerektiren şiddetli pelvik ağrı oluştu. **Sonuç:** Endometrioma nedeni ile oosit kriyoprezervasyonu yapılan bekar hastalarda transabdominal oosit toplanması etkin ve güvenilir bir yöntemdir.

Anahtar Kelimeler: Dondurarak saklama; endometriyoz; oosit toplanması

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Since the first description of IVF in the late 1970's, in which oocyte collection was performed using laparoscopic surgery, there has been a remarkable technological and scientific improvements in the field.¹ With these improvements, in addition to ART success patient safety has become one of the central parts of any utilized novel modern treatment modalities.

The conventional oocyte retrieval procedures are performed using standardized oocyte pick-up needles attached on to a vaginal probe. The advantage of vaginal oocyte retrieval is the close proximity of the ovaries with the applied probe with an increased resolution. However, it may not always be easy to access the ovaries in some patients from the vaginal route due to uterine pathologies including fibroids, congenital uterine malformations, and endometriosis or pelvic adhesion all preventing ovarian access.

Lenz et al. was the first to describe using a transabdominal route for oocyte retrieval in 1981.² Then, the method has been utilized in some specific clinical circumstances such as; patients previously underwent hysterectomy for a surrogate pregnancy, those undergoing ovarian transposition, having Müllerian anomalies and patients with distorted pelvic anatomy which prevents vaginal access.^{3,4} Moreover, the applicability of the procedure was demonstrated for follicle aspiration from heterotopically transplanted ovarian cortical fragments by two different teams.^{5,6} In a retrospective study, Baldini et al., was the first to review the records of 1972 oocyte pick up procedures and identified 21 women, in which both transabdominal and transvaginal approaches were performed by using the same ultrasound vaginal probe.⁷ In two previous reports, we demonstrated the effectiveness and safety of transabdominal oocyte retrieval using a vaginal probe in patients undergoing IVF for oocyte cryopreservation.^{8,9} In this retrospective cohort study, we further aimed to analyze whether transabdominal oocyte retrieval is a safe and effective technique in virgin patients with endometrioma undergoing IVF for the purpose of oocyte cryopreservation.

MATERIAL AND METHODS

Thirteen virgin patients with endometrioma who underwent transabdominal oocyte pick-up for the pur-

pose of oocyte cryopreservation between April 2021 and July 2023 were enrolled in this retrospective cohort study. Demographic characteristics, and hormonal assessment including AMH, day 3 serum FSH, LH, estradiol and progesterone levels, and antral follicle counts were recorded. Primary outcome measures were number of oocytes retrieved, number of metaphase 2 oocytes frozen, and complication rates, while secondary outcome measures were duration of stimulation and cumulative gonadotropin dose. As an additional primary outcome measure, we also included a modified follicle oocyte index (FOI) calculated by dividing the total number of collected oocytes by total number of follicles ≥ 12 mm at trigger day as described previously by us.⁹

The study was performed under the principles of Helsinki Declaration, however it was performed by reviewing the patient datasheets retrospectively, no ethical approval was provided. All of the patients underwent progesterone primed ovarian stimulation using 5 mg medroxyprogesterone acetate three times daily (Tarlusal, Deva, Türkiye) with a fixed gonadotropin starting dose ranging between 150 IU/day and 225 IU/day. For ovarian stimulation a combination of recombinant FSH (Gonal F, Merck, Türkiye) and highly purified human menopausal gonadotropins (Menopur, Ferring Pharmaceuticals, Meriofert, IBSA, Türkiye), or a combination of recombinant FSH and LH (Pergoveris, Merck Türkiye) were used in all patients. Follicle growth was monitored using a transabdominal ultrasound probe, and a serial serum estradiol, luteinizing hormone (LH), and progesterone measurements were performed as required.

Final oocyte maturation was triggered when at least 2 follicles >18 mm was observed using dual trigger method performed with 250 mg of hCG (Ovitrelle, Merck, Türkiye) and 0.2 mg of a GnRH analog (Gonapeptyl, Ferring Pharmaceuticals, Türkiye) as previously described by Seval et al.¹⁰ All transabdominal oocyte pick up procedures was performed according to the algorithmic approach previously described by us.⁸ Oocyte pick-up procedures were performed using a 17-gauge double lumen oocyte retrieval needle Cook Medical Australia, Geotek Healthcare Products, Türkiye) at 35.5 hours follow-

ing trigger under inhalation anesthesia (Figure 1). A suction pressure pump adjusted at 150-180 mmHg was utilized (Labotec precise aspiration pump, Germany). For all oocyte retrieval procedures, a standard transvaginal ultrasound probe was used (4-8 MHz vaginal probe; GE, USA, Logic P5, Philips Clea Vue 350, Netherlands), and all patients received 1 gram of Cefazolin (Cefamezin, Sanofi, Türkiye) and 50 mg of dexketoprofene (Arvels, Manarini, Türkiye).

RESULTS

The mean age of patients was $32,7\pm 8,5$ (range; 21-44) and mean body mass index was $25,4\pm 2,2$ kg/m^2 (range; 23,7-29,4 kg/m^2) (Table 1). Of the patients 12 had unilateral, one had bilateral endometrioma. The mean diameter of the endometriomas was $48,07\pm 23,6$ mm (range; 22-100mm). Only one patient had a previous laparoscopic surgery for endometrioma.

The mean serum AMH was $0,62\pm 0,32$ ng/ml (range; 0,24-1,04 ng/ml), mean day 3 serum FSH was $9,3\pm 2,4$ IU/mL (range; 4,6-13 IU/mL), mean day 3 serum estradiol was $60,03\pm 28,6$ pg/ml (range; 24-109



FIGURE 1: The technique showing transabdominal ultrasound guided follicular aspiration for oocyte retrieval using a vaginal ultrasound probe.

TABLE 1: Demographic characteristics and basal hormonal assessment of the patients.

Variable	Mean	Range
Age (years)	$32,7\pm 8,5$	21-44
BMI (kg/m^2)	$25,4\pm 2,2$	23,7-29,4
AMH (ng/ml)	$0,62\pm 0,32$	0,24-1,04
D3 FSH (IU/mL)	$9,3\pm 2,4$	4,6-13
D3 Estradiol (pg/ml)	$60,03\pm 28,6$	24-109
AFC (n)	$6,02\pm 2,92$	1-11
Diameter of endometriomas (mm)	$48,07\pm 23,6$ mm	22-100

TABLE 2: Ovarian stimulation outcome of the patients with endometrioma undergoing transabdominal oocyte retrieval.

Variable	Mean	Range
Follicles >12 mm on trigger day (n)	$5,75\pm 3,1$	1-10
Cumulative gonadotropin consumption (units)	1659 ± 546	750-2475
Duration of stimulation (days)	$8,5\pm 1,98$	5-12
Duration of the procedure (min.)	$8,3\pm 3,9$	2-14
Oocytes retrieved (n)	$5,5\pm 3,1$	2-11
Mature oocytes frozen (n)	$4,1\pm 2,2$	1-9

pg/ml), and mean antral follicle counts was $6,02\pm 2,92$ (range; 1-11). The mean duration of stimulation was $8,5\pm 1,98$ days (range; 5-12 days), mean cumulative gonadotropin consumption was 1659 ± 546 units (range; 750-2475 units), mean duration of the procedure was $8,3\pm 3,9$ min. (range; 2-14 min), mean number of oocytes retrieved was $5,5\pm 3,1$ (range; 2-11) and mean number of oocytes frozen was $4,15\pm 2,23$ (range; 1-11) (Table 2). The mean modified follicle oocyte index was $0,93\pm 0,17$ (range; 0,66-1,25).

No major intraoperative or postoperative complication occurred in any of the patients. Only one patient was temporarily hospitalized for severe pelvic pain and discharged healthy. None of the patients returned with an intend to use cryopreserve oocytes at the time of manuscript writing.

DISCUSSION

In this retrospective cohort study, we demonstrated that transabdominal oocyte retrieval was a safe and effective method in patients with endometrioma undergoing IVF for the purpose of oocyte cryopreservation.

It has consistently been demonstrated that the presence of endometriomas reduces ovarian reserve.¹¹ However, the most feared complications in patients with endometrioma during oocyte retrieval is pelvic abscess, and inability to reach the ovaries due to pelvic adhesions. Many studies showed that the risk of pelvic infection is very low as <0.5% when prophylactic antibiotics are used.¹² However, some well-designed studies demonstrated that in patients undergoing IVF with endometrioma, tubo-ovarian abscess is not linked to the ART procedure, but rather represents a sporadic occurrence in endometriosis.¹³ In none of our patients we encountered pelvic infection following the retrieval procedure. In none of the patients we were unable to complete the procedure due to existing endometriotic cysts. Even though the mean size of the endometrioma was 48 mm, there was no difficulty encountered during the procedure. Moreover, endometriomas bigger in size usually moved the ovaries toward to abdominal wall enabling the procedure easier.

In the first reports of abdominal oocyte retrieval, according to the description the authors inserted a needle through the abdominal wall and bladder into the follicles and a transient hematuria occurred in four patients.² In our technique since the bladder was empty no such complication occurred. However, in a previous paper describing the procedure, we reported superficial epigastric artery injury in two patients both resolved spontaneously. However, both these two cases were among the initial cases before we optimized the procedure. The only complication was severe pelvic pain resolved spontaneously. The duration of the procedure was also quite acceptable which was 8.3 ± 3.9 min. This is mainly because of increased experience and complying all steps described as an algorithmic approach.

One may question whether transabdominal oocyte retrieval is as efficient as transvaginal route. In a previous report we also demonstrated that the IVF outcome parameters were not different between those undergoing vaginal vs. abdominal oocyte retrieval.⁸

In this cohort we additionally calculated oocyte follicle index which was measured as 0.93 ± 0.17 , indicating high efficiency the procedure

With the changing novel rules of the modern industrialized world that includes increasing number of women choosing a single life, ongoing uncompleted educational issues, and some economic concerns, the number of women wishing to postpone fertility into the late reproductive years has been on the rise globally. In addition, thanks to the increased life expectancy, improvements in early cancer detection techniques and novel treatment modalities, the number of cancer survivors has also increased exponentially.¹⁴ Moreover, Fertility rates declined sharply over the 50 years in modern industrialized world. As a result, preservation fertility has become a paramount concern for both cancer survivors, those undergoing gonadal surgery or wishing to postpone fertility for future life plans.

CONCLUSION

Single women with an intent to preserve fertility, can be offered transabdominal oocyte retrieval using a vaginal probe for the purpose of oocyte cryopreservation. However, future studies with larger sample sizes are required to make a more clear-cut conclusion comparing vaginal vs. abdominal oocyte retrieval in terms of safety and effectiveness.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

This study is entirely author's own work and no other author contribution.

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