Australian Journal of Biomedical Research
(eISSN 3083-4708)

Original Article

Ultrasound-Guided Trans-Abdominal Oocyte Retrieval During in Vitro Fertilization: Applicability and Safety of a Necessary Intervention in Nigeria

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Received: Dec 24, 2025
Accepted: Feb 21, 2026

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Abstract:

Background: Controlled ovarian hyperstimulation and oocyte retrieval are key stages in the in vitro fertilization process. If developing follicles are difficult to access or visualize using the preferred imaging method (transvaginal ultrasound scan), careful monitoring with transabdominal ultrasound and oocyte retrieval may be required to avoid cycle cancellation and enhance in vitro fertilization (IVF) treatment success.

This study aimed to assess the feasibility, pregnancy outcomes and presence of risk factors among a cohort of women who had transabdominal oocyte retrieval during their IVF treatment process

Methods: This was a retrospective cross-sectional study carried out at Kingswill Specialist Hospital, Lagos Nigeria from January 2020 to December 2023. Medical records of women who had transabdominal oocyte retrieval (TAOR) were retrieved and variables such as socio-demographic variables, indications and pregnancy outcomes were analysed.

Results: Fifty-seven women had TAOR during the study period. The mean age of the women was 36.2 ± 4.28 SD years. Their mean weight was 86.0kg ± 14.79 SD. Twenty-six (45.6%) had pelvic masses, 50.9% had previous pelvic surgeries.

There were 21 (36.8%) conceptions, 38 (66%) live births and 5.2% miscarriages.

Conclusion: Couples' desire to conceive continues to pose a significant challenge in sub-Saharan Africa, where wealth and strength are sometimes equated to family size, often accompanied by substantial social, psychological, and economic consequences for affected individuals. When IVF treatment cycles are cancelled due to inaccessible oocytes, these burdens are further intensified, sometimes with severe psychological and financial repercussions. To improve outcomes and enhance patient satisfaction and safety, it is essential to prioritize careful patient selection, thorough evaluation of key clinical factors, and the customization of care. In this context, transabdominal oocyte retrieval has been observed to be a potentially safe and necessary intervention. However, the small sample size of 57 patients limits the ability to draw definitive conclusions about its safety and efficacy, and the absence of a control group restricts the ability to compare outcomes relative to transvaginal oocyte retrieval (TVOR) patients.

Keywords: In Vitro Fertilisation; Transabdominal Oocyte Retrieval; Infertility; Obesity; Pelvic Masses

Introduction

In Nigeria, demand for fertility care has risen sharply in recent years, reflecting not only greater availability of assisted reproductive services but also shifts in patient awareness, treatment success rates, and procedural options that reduce cycle cancellations and mitigate the psychological burden of infertility [1]. The expansion of fertility centers and the dissemination of knowledge about treatable causes of infertility suggest a health system trend toward wider access and uptake, particularly among sub fertile couples actively seeking intervention.

Within assisted reproductive technology (ART), the choice of follicular aspiration technique directly impacts clinical outcomes, patient safety, and procedural efficiency. Since the advent of IVF, multiple approaches have been developed transabdominal laparoscopic, transabdominal ultrasound-guided, transabdominal-transvesical, and transvaginal ultrasound-guided methods each with distinct risk benefit profiles. Although the transabdominal-transvesical ultrasound approach yields a high number of oocytes, its association with urinary tract infections and post-procedural hematuria has reduced its adoption in favor of safer alternatives [2-4].

Currently, transvaginal ultrasound-guided oocyte retrieval (TVOR) is considered the procedural gold standard, offering advantages of minimal invasiveness, anatomical proximity to the ovaries, and shorter operative time [2, 3]. This innovation marked a critical departure from more invasive laparoscopic retrieval methods. However, TVOR's reliance on transvaginal access creates limitations in cases where anatomical, surgical, or cultural factors preclude its use.

In such scenarios, transabdominal ultrasound-guided oocyte retrieval (TAOR) provides a viable alternative [4-6]. Its utility is particularly evident among patients with inaccessible ovaries due to severe pelvic adhesions, ectopic ovarian location, Müllerian anomalies, or prior pelvic surgeries such as hysterectomy or oophoropexy [4, 5, 6]. TAOR also offers a procedural pathway in populations where cultural or religious norms prohibit transvaginal intervention, as well as in women with intact hymens, central obesity, or prior failed TVOR attempts [5, 6, 7].

Despite these advantages, TAOR presents a higher procedural risk profile compared to TVOR. Its greater invasiveness and extended operative time increase the probability of bowel injury, anterior abdominal vessel trauma, hemorrhage, infection, and postoperative pain often necessitating additional analgesia [5-8]. The technique's safety and efficacy must therefore be assessed not only by pregnancy outcomes but also by complication rates and patient-specific risk factors.

Against this backdrop, the present study evaluates the feasibility, reproductive outcomes, and risk determinants associated with TAOR in a Nigerian IVF cohort, aiming to clarify its role in contexts where TVOR is not practicable.

Methodology

Study design and setting

This was a retrospective cross-sectional study carried out at Kingswill specialist Hospital, Lagos Nigeria from January 2020 to December 2023.

Kingswill Specialist Hospital is a leading fertility centre located in FESTAC Town, Lagos. The main facility is situated at 3 Ayinuola Close, opposite Startimes by Apple Junction, Amuwo Odofin, Lagos, Nigeria. The hospital also operates an annex the Advanced Fertility Centre located at Plot 196, Chief Sunny Ogbiede Close, Diamond Estate, Amuwo Odofin, Lagos.

Our study population and inclusion criteria

This included women who presented to the hospital during the study period who had any of the indications mentioned earlier or those who opted for TAOR

Inclusion Criteria

This study included women who had previously experienced failed transvaginal oocyte retrieval (TVOR), as well as those with a history of multiple pelvic surgeries and suspected pelvic adhesions. It also included oocyte donors with Müllerian anomalies or intact hymen, and women who elected to undergo transabdominal oocyte retrieval for religious or personal reasons.

Exclusion Criteria

Women who had both transvaginal and transabdominal follicular aspiration were excluded from the study. Also, excluded were those who did not give consent to participate in the study during their IVF journey.

Ethical Clearance

Ethical approval for this study was obtained from the Research and Ethics Committee of the 68 Nigerian Army Reference Hospital, Yaba, Lagos. The study was conducted in accordance with the principles of the Declaration of Helsinki. Given the retrospective nature of the study, informed consent was waived, and all patient data were anonymized prior to analysis to ensure confidentiality.

Procedure Description Of Transabdominal Ultrasound–Guided Oocyte Retrieval

Ovarian stimulation was achieved with a recombinant follicle-stimulating hormone, rFSH (Gonal-F; Merk, or Follisurge: Intas, India) and/or a urinary FSH (Menopur; Ferring, Germany). The starting dose of gonadotropin was determined based on the Anti-Mullerian hormone (AMH) levels, age of the women, antral follicle count (AFC), day 3 FSH, and previous ovarian response, when available. The response to stimulation was monitored using and transvaginal or transabdominal ultrasound assessment as deemed appropriate. The criterion for human chorionic gonadotropin (hCG) administration was the presence of three or more follicles exceeding 17mm in diameter. Oocyte retrieval was carried using a 17F size oocyte retrieval needle 34-36 h after hCG administration.

Either spinal or general anaesthesia (using intravenous propofol) was administered. The patient was positioned supine with an emptied bladder. The abdominal skin was prepared using a povidone-iodine solution, which was then wiped off with normal saline. A sterile needle guide was then mounted onto an abdominal ultrasound probe that had been draped in a sterile cover. A minimal amount of ultrasound gel was subsequently applied to the area. Unlike conventional abdominal ultrasound examinations, all patients underwent bladder emptying prior to the procedure to enhance the proximity of the ovaries to the ultrasound probe. If bowel loops, large blood vessels, or the bladder were visualized in the needle path during the scan, steady pressure with the probe was applied to displace these structures, minimizing risk and allowing closer access to the ovarian follicles. Colour Doppler was seldom employed and reserved for instances where blood vessels were not clearly visible on grayscale imaging. Following the procedure patients were observed for 12 hours for and sign of complications. They were also reviewed daily for 72 hours post procedure. Embryo transfer protocol was the same for all patients.

Data Management and Analysis

Data were collected using a standardized pretested proforma designed for the study. variables of interest were age, parity, body mass index, history of laparotomy or open pelvic surgeries presence of pelvic mass and outcome of treatment. Data was analysed using IBM SPSS Statistics Version 29 (IBM Corp., Armonk, NY, USA). Categorical variables were summarized using frequency distribution tables, while continuous variables were expressed as means with corresponding standard deviations. The total number of oocytes retrieved, occurrence of any complications, fertilization rate, number of high-quality embryos available for transfer, number of clinical pregnancies (defined as the presence of at least one gestational sac), and ongoing pregnancies (beyond 12 weeks of gestation) were recorded. A p-value of <0.05 was considered statistically significant.

Results

A total of 57 medical case records who had TAOR during the period of review were studied. They were mostly of low parity. The patients had a mean age of 36.2 ± 4.28 SD (Table 1).

Table 1: Socio-demographic characteristics women who had transabdominal oocyte

Age group (years)	**Frequency n=57(%)**	**(%)**
25 – 29	4	7.0
30 – 34	11	19.3
35 – 39	29	50.9
40 – 44	13	22.8
Mean ± SD	36.2 ± 4.28	
Parity		
0	43	75.4
1	8	14.0
2	5	8.8
3	1	1.8
BMI (kgm^{-2})		
18.5-24.9	11	19.3
25-29.9	17	29.8
≥30	29	50.9

Presence of pelvic mass was seen 26 (45.6%) comprising 24 cases of uterine fibroid (92.3%) and 2 cases of presence of ovarian cyst (7.7%). (Table 2).

Table 2: Indications for transabdominal oocyte retrieval

Indication	Frequency (%)	95%CI
Presence of Pelvic mass		
Yes	26(45.6)	0.03–0.26
No	31(54.4)	
Size of Pelvic mass (pregnancy weeks size)		
≤ 12	12 (46.1)	
13 – 16	10(38.5)	0.12–0.51
> 16	4(15.4)	
Type of Pelvic mass		
Fibroid	24(92.3)	0.05–0.33
Ovarian cyst	2(7.7)	
Previous pelvic surgeries		
Yes	29(50.9)	
No	28(49.1)	0.06–0.23
Other indications		
Yes	3 (5.27)	
No	54(94.73)	
95%CI- 95 % confidence interval		

About half had had at least a laparotomy (50.9%) with 20 of the 29 (69.0%) having had only one laparotomy, 8(27.6%) had two laparotomies and only 1 (3.4%) have had three repeat laparotomies (Figure 2a, b).

A

B

Figure 1: A) Transabdominal and B) transvaginal ultrasound image of the right (a)and left (b) stimulated ovaries of same patient just before oocyte retrieval.

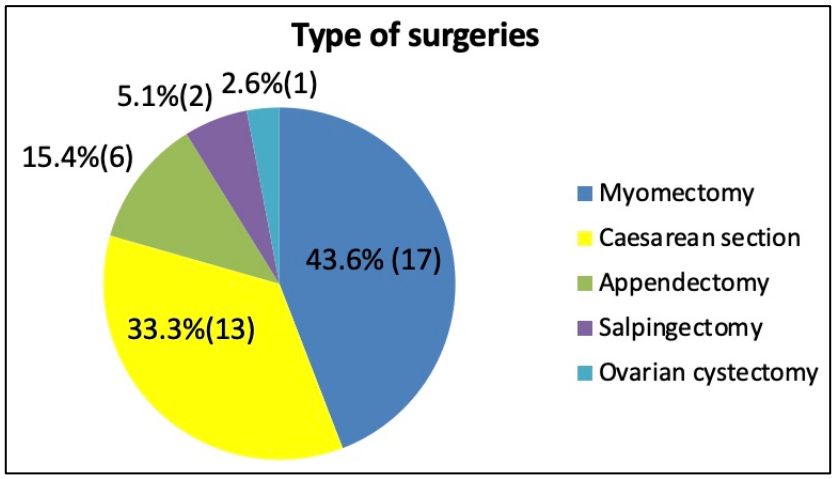

Figure 2a: Laparotomy surgeries (n = 39)

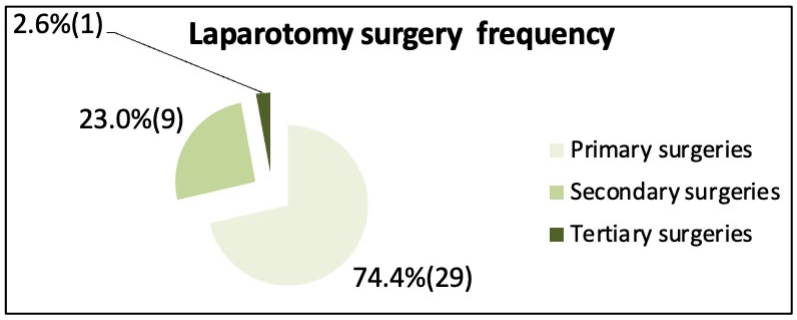

Figure 2b: Women with repeat surgeries (n = 39).

Table 3 shows other pelvic surgeries had by our cohort. myomectomies accounted for 48.2%, caesarean sections 24.1%, appendectomies 20.7%, salpingectomy for tubal ectopic gestation 3.5% and ovarian cystectomy 3.5%.

Table 3: Previous Surgical Procedures Among Study Participants

Variable (n = 39)	Frequency	n=29	(%)
Primary laparotomy			
Myomectomy	14		48.1
Caesarean section	7		24.7
Appendectomy	6		20.7
Salpingectomy	1		3.5
Ovarian cystectomy	1		3.5

Percentages are calculated based on the total number of participants with a documented history of prior surgery.

In table 4, using Multivariate analysis, it was shown that presence of pelvic mass and previous pelvic surgery were significant predictors of TAOR in our cohort.

Table 4: Multivariable Logistic Regression Analysis of Factors Associated with Ultrasound-Guided Transabdominal Oocyte Retrieval

Variable	Odds ratio	95% CI	P-value
Age			
25-29	1.00	Ref	Ref
30-34	0.15	0.06-1.22	0.80
35-39	0.81	0.33-1.72	0.76
40-44	0.74	0.4-2.9	0.84

Table 4. Cont.

Variable	Odds ratio	95% CI	P-value
Presence of Pelvic mass	1.00	Ref	Ref
Yes	1.5	0.5-3.1	0.02
No	1.4		
Previous pelvic surgery		Ref	Ref
Yes	1.00	0.7-2.4	0.004
No	1.3		

CI, confidence interval.

Discussion

This study evaluated ultrasound-guided transabdominal oocyte retrieval (TAOR) in the context of in-vitro fertilization (IVF), focusing on its applicability and safety as a necessary intervention in a developing economy. The demographic and clinical profile of the cohort reveals several intersecting risk factors that explain the procedural choice.

The high prevalence of uterine fibroids (48.2%) is consistent with the established association between advancing maternal age, low parity, and fibroid burden among women of African descent. The predominance of myomectomy as the most frequent prior pelvic surgery (44.4%) reflects both the clinical consequences of fibroids and the surgical patterns in the region. This aligns with reports that pelvic masses, including malignancies, are more frequently observed in women undergoing TAOR [9, 10]. The mechanistic explanation that such masses displace the ovaries cranially, rendering them inaccessible to the transvaginal route provides a clear anatomical rationale for procedural selection.

Body mass index (BMI) further emerges as a decisive factor: overweight and obese women comprised 80.7% of the cohort. This mirrors earlier studies linking elevated BMI to higher rates of TVOR failure, thereby increasing reliance on TAOR [11, 13]. Excess adipose tissue can alter pelvic anatomy by displacing the ovaries and lengthening the needle path, which may hinder complete follicle aspiration [12, 14]. This suggests that obesity is not merely a background demographic variable but a procedural determinant with potential effects on both feasibility and oocyte yield.

The observation that over half of participants had undergone prior pelvic surgery reinforces the procedural rationale. Previous literature, including Sönmezer et al., has demonstrated that cumulative surgical history increases the likelihood of pelvic adhesions, which in turn complicates transvaginal access [6]. This relationship suggests that surgical history should be a key screening parameter when determining optimal oocyte retrieval approach.

From an outcome perspective, the cumulative pregnancy rate of 36.8% falls within the range reported by Nigerian studies (28.9–44.4% per cycle) [15, 16]. The live birth rate in this cohort (66%) exceeds the 25–33.3% reported by Makwe et al., potentially reflecting advances in stimulation protocols, embryology techniques, or patient selection over time [16]. The lack of statistically significant differences in pregnancy rates reported in previous comparative studies [17, 19, 20] suggests that transabdominal oocyte retrieval (TAOR), when used in appropriately selected cases, has not been associated with reduced reproductive outcomes. However, direct comparisons with transvaginal oocyte retrieval (TVOR) should be interpreted cautiously, particularly in the absence of a contemporaneous control group.

Conclusion

Couples' desire to conceive continues to pose a significant challenge in sub-Saharan Africa, where wealth and strength are sometimes equated to family size, often accompanied by substantial social, psychological, and economic consequences for affected individuals. When IVF treatment cycles are cancelled due to inaccessible oocytes, these burdens are further intensified, sometimes with severe psychological and financial repercussions. To improve outcomes and enhance patient satisfaction and safety, it is essential to prioritize careful patient selection, thorough evaluation of key clinical factors, and the customization of care. In this context, transabdominal oocyte retrieval has been observed to be a potentially safe and necessary intervention. However, the small sample size of 57 patients limits the ability to draw definitive conclusions about its safety and efficacy, and the absence of a control group restricts the ability to compare outcomes relative to transvaginal oocyte retrieval (TVOR) patients.

Also, this was a single centre retrospective study which may not be a true reflection of TAOR in

Lagos. However, considering that it is done in a developing economy with limited resources and expertise, the significance cannot be overemphasized. we do recommend a study comparing pregnancy outcomes following TAOR and TVOR oocytes respectively to further access the importance of this important procedure in the population of infertile couples.

Acknowledgements

Consent: A written informed consent was obtained from the patient for both the treatment procedure and for publication of findings obtained.
Conflicts of Interest: The authors declare that they have no conflicts of interest.
Acknowledgments: We are grateful to all the patients and the families in this study for their support and to Late the founder of Kingswill Specialist Hospital where this study was conducted.
AI Use Statement: We herebey state that no artificial intelligence such as ChatGpt, GROK or COPILOT was used at any stage during the preparation of this manuscript.

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