International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Siddiqua A et al. Int J Reprod Contracept Obstet Gynecol. 2026 Aug;15(8):3312-3318
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20262582

Case Report

Beyond the vaginal route: successful oocyte retrieval using a transabdominally adapted transvaginal ultrasound probe in a frozen pelvis: a case report

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Received: 08 June 2026
Revised: 08 July 2026
Accepted: 10 July 2026

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ABSTRACT

Transvaginal ultrasound-guided follicular aspiration constitutes the gold standard for oocyte retrieval in assisted reproductive technology (ART). However, complex pelvic pathology including severe adhesive disease, adenomyosis, and sequelae of prior pelvic surgery may profoundly distort adnexal anatomy, rendering conventional transvaginal access technically hazardous or anatomically precluded. We present a 38-year-old woman with primary infertility of 12 years' duration, diminished ovarian reserve (DOR), diffuse uterine adenomyosis, and a complex surgical history encompassing open myomectomy and adenomyomectomy, referred for in vitro fertilization (IVF). Baseline ultrasonography disclosed markedly distorted adnexal anatomy with bilateral ovarian adhesion to adjacent pelvic structures. Following controlled ovarian stimulation (COS) via a clomiphene citrate–GnRH antagonist protocol, bilateral ovarian inaccessibility via the transvaginal route was confirmed intraoperatively. Transabdominal ultrasound-guided oocyte retrieval was therefore performed using a high-frequency transvaginal transducer repositioned and applied abdominally. Five dominant follicles were successfully aspirated without procedural morbidity, yielding five oocytes. Transabdominal oocyte retrieval employing an abdominally applied transvaginal ultrasound transducer is a technically feasible, safe, and clinically effective alternative in patients in whom conventional transvaginal retrieval is anatomically precluded. This approach may avert cycle cancellation and optimise cumulative oocyte yield in poor ovarian responders with complex adnexal anatomy.

Keywords: Transabdominal oocyte retrieval, Transvaginal ultrasound probe, *In vitro* fertilization, Inaccessible ovaries, Pelvic adhesions, Diminished ovarian reserve, Assisted reproductive technology

INTRODUCTION

Transvaginal ultrasound-guided follicular aspiration has been the universally accepted technique for oocyte retrieval in ART since its introduction in the mid-1980s.[1] The procedure is minimally invasive, highly reproducible, and consistently associated with favourable oocyte recovery rates and a low complication profile. However, a subset of patients presenting for IVF harbours underlying gynaecological pathology that fundamentally compromises adnexal accessibility. Conditions such as severe pelvic adhesive disease, endometriosis, diffuse uterine adenomyosis, leiomyomata, and sequelae of multiple prior pelvic surgical interventions may collectively distort the normal topographic relationships of the adnexa, fix the ovaries in ectopic positions, and render follicular puncture via the vaginal fornices technically arduous or associated with unacceptable procedural risk.[2,3]

In patients with DOR, the reproductive significance of each individual developing follicle is disproportionately heightened, and cycle cancellation consequent upon retrieval failure carries a considerable clinical and psychological burden.[4] Alternative oocyte retrieval strategies, including transabdominal and transrectal approaches, have been described in select challenging cases. As recently advocated by Melado et al., reproductive medicine must broaden its procedural repertoire to accommodate anatomical and clinical diversity, ensuring truly individualised ART care.[5]

The deployment of a high-frequency transvaginal ultrasound transducer in an abdominal scanning position may confer superior spatial resolution and enhanced near-field follicular delineation relative to conventional low-frequency transabdominal probes, thereby improving procedural safety and precision.[6,7] We report a case of successful transabdominal oocyte retrieval utilizing an abdominally applied transvaginal transducer in a patient with severe surgically induced pelvic distortion compounded by diffuse adenomyosis, and discuss the technical considerations and clinical implications of this approach.

CASE REPORT

A 38-year-old woman presented to our reproductive medicine unit in January 2025 with a 12-year history of primary infertility. Her demographic and clinical profile is summarised in Table 1.

Table 1: Patient demographics and clinical profile.

Parameter	Details
Age	38 years
Parity	Nulliparous (G0P0)
Duration of infertility	12 years (primary infertility)
Menstrual history	Regular cycles; 30-day intervals; menstrual flow 2–3 days; mild dysmenorrhoea; no intermenstrual bleeding; no dyspareunia
Medical comorbidities	Primary hypothyroidism (levothyroxine 125 µg/day); hypercholesterolaemia (conservative management)
Relevant negatives	No diabetes mellitus, hypertension, tuberculosis, or substance use
Reproductive diagnoses	Diffuse uterine adenomyosis; uterine leiomyomata; severe pelvic adhesive disease; DOR; POR

The patient's surgical and prior IVF history was extensive and is summarised in Table 2. She had undergone laparotomy with abdominal myomectomy in 2010, followed by repeat open myomectomy in 2019 for recurrent symptomatic uterine leiomyomata; both procedures were performed at external centres. Both surgical episodes were complicated by progressive pelvic adhesive disease, resulting in bilateral ovarian adhesion to the posterior uterine serosa and adjacent pelvic peritoneum with consequent marked distortion of adnexal anatomy. Prior to her referral to our unit, she had undergone three IVF cycles at external centres between May and August 2025, with consistently poor oocyte yield and recurrent implantation failure, consistent with a diagnosis of DOR and poor ovarian response Poisedon 4 (POR).

Pre-stimulation ovarian reserve assessment confirmed markedly compromised reserve, with a serum anti-Müllerian hormone (AMH) of 0.628 ng/ml, a baseline antral follicle count (AFC) of 3, and a baseline endometrial thickness of approximately 5.0 mm. Pelvic sonography disclosed severely distorted adnexal architecture. The right ovary was eccentrically positioned posterosuperior to the uterus with poor transvaginal accessibility, while the left ovary demonstrated a thin-walled anechoic cyst measuring approximately 18×17 mm with approximately three antral follicles and appeared adherent to the posterolateral uterine wall. Baseline investigations and ultrasonographic findings are presented in Table 3. Figure 1 illustrates the pre-stimulation ultrasound confirming deep ovarian displacement and the activated biopsy needle guide set to 16.6 cm depth.

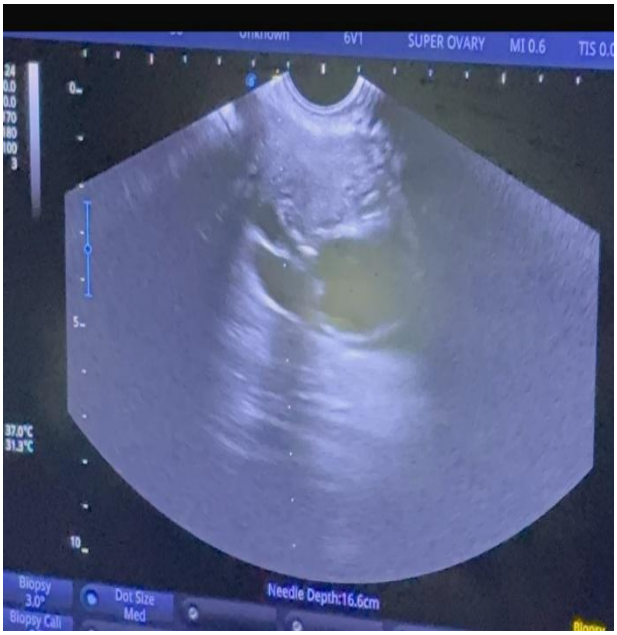

Figure 1: Distorted adnexal anatomy: deep posterosuperior ovarian displacement on pre-stimulation scan. SonoScape 6V1 transvaginal transducer, operating frequency 6–10 MHz; biopsy mode active; needle depth guide 16.6 cm.

Controlled ovarian stimulation was initiated with a GnRH antagonist protocol, selected in view of the patient's established POR status. The regimen comprised oral clomiphene citrate 150 mg daily combined with recombinant follicle-stimulating hormone (rFSH 300 IU)

and human menopausal gonadotrophin (hMG 75 IU). Adjunctive co-treatments including dehydroepiandrosterone (DHEA), antioxidant supplementation, coenzyme Q10, and N-acetylcysteine were continued throughout. Serial monitoring demonstrated gradual follicular recruitment in both ovaries, with follicle sizes ranging from 10–18 mm at mid-stimulation and 18–23 mm at trigger. Serum estradiol (E_2) rose from 238 pg/ml at mid-stimulation to approximately 1427 pg/ml at trigger, and endometrial thickness progressed from 4.9 mm to approximately 7.6 mm. Consistent sonographic visualisation remained technically compromised throughout, owing to deep and posteriorly displaced ovarian positions, dense adhesive disease, acoustic shadowing from the adenomyotic uterus, and disruption of normal pelvic sonoanatomy. Parameters at trigger are summarised in Table 4.

Table 2: Surgical and prior IVF cycle history.

Year	Procedure	Centre	Indication	Oocyte yield, embryo outcome & result
2010	Laparotomy + myomectomy	External	Symptomatic uterine leiomyomata	Fibroids excised; early pelvic adhesions noted intraoperatively
2019	Repeat open myomectomy	External	Recurrent uterine leiomyomata	Progressive pelvic adhesive disease; altered adnexal anatomy documented
May 2025	IVF – Long GnRH agonist protocol	External centre	Primary infertility; DOR	2 oocytes retrieved → 2 fertilised → Day-3 fresh embryo transfer → Beta hCG negative
Jul 2025	IVF – GnRH antagonist protocol	External centre	Primary infertility; DOR	4 oocytes retrieved → fertilised → 1 Day-3 embryo cryopreserved
Aug 2025	IVF – GnRH antagonist protocol	External centre	Primary infertility; DOR	2 oocytes retrieved → 1 Day-3 embryo → embryo cryopreserved
Oct 2025	Frozen embryo transfer (FET)	External centre	Deferred transfer of cryopreserved Day-3 embryo from Jul 2025 cycle	1 Day-3 embryo thawed and transferred → Beta hCG negative

Table 3: Baseline investigations and ultrasonographic findings.

Parameter	Baseline value
Serum AMH (ng/ml)	0.628
Antral follicle count (AFC)	3
Endometrial thickness (mm)	~5.0
Serum E_2 (pg/ml)	33.6
Follicle size range (mm)	5–8
Uterine findings (USG)	Diffuse adenomyosis; intramural fibroids; ET ~5 mm
Right ovary (USG)	Eccentrically positioned posterosuperior to uterus; poor transvaginal accessibility Sub optimally visualised; ~2 AFC
Left ovary (USG)	Adherent to posterolateral uterine wall; thin-walled anechoic cyst 18×17 mm; ~3 AFC

Table 4: Monitoring parameters and ultrasonographic findings at trigger.

Parameter	Value at Trigger
Endometrial thickness (mm)	~7.6
Serum E_2 (pg/ml)	~1427
Dominant follicle size range (mm)	18–23
No. of dominant follicles	~5
Uterine findings (USG)	Adenomyotic uterine enlargement; adnexal cysts; encysted collections; free fluid in right adnexa
Right ovary	Persistently displaced posterosuperior; inaccessible transvaginally

Continued.

Parameter	Value at Trigger
Left ovary	Adherent; follicles 18–23 mm; inaccessible transvaginally
Trigger drug 1	Ovitrelle® 250 mcg (recombinant hCG; Merck)
Trigger drug 2	Decapeptyl® 0.1 mg × 2 doses (GnRH agonist; Ferring Pharmaceuticals)

Final oocyte maturation was induced utilising a dual-trigger protocol comprising recombinant human chorionic gonadotrophin (Ovitrelle® 250 mcg; Merck) and a GnRH agonist (Decapeptyl® 0.1 mg × 2 doses; Ferring Pharmaceuticals). Oocyte retrieval was scheduled for 35 hours post-trigger under conscious sedation. However, upon intraoperative assessment, transvaginal oocyte retrieval proved technically unfeasible. Attempted vaginal probe positioning revealed bilateral ovarian inaccessibility: the right ovary remained deeply positioned posterosuperior to the uterus, eccentrically located beyond comfortable reach of the vaginal fornices, while the left ovary—although containing follicles of appropriate size—was firmly adherent to the posterolateral uterine wall with severe restriction in probe mobility.

Intraoperative sonographic visualization was severely compromised. Dense pelvic adhesions created acoustic shadowing that obscured precise follicular margins. The adenomyotic uterus produced significant ultrasound artifact, and the combination of ovarian displacement, distorted adnexal architecture, and acoustic interference rendered reliable real-time follicle localization impossible via the conventional transvaginal approach. Pursuit of forceful transvaginal needle advancement risked substantial morbidity, including hemorrhage, bowel perforation, and vascular injury, particularly given the patient's poor ovarian reserve where cycle cancellation would carry disproportionate clinical cost.

Recognizing the clinical impasse, a decision was made to adapt the retrieval strategy to a transabdominal approach, exploiting the superior imaging capability of a high-frequency transvaginal transducer to overcome the anatomical obstacles.

Pre-retrieval assessment confirmed bilateral ovarian inaccessibility via the conventional transvaginal route, and a decision was made to proceed with transabdominal ultrasound-guided oocyte retrieval under conscious sedation. The procedure was performed using a high-frequency transvaginal ultrasound transducer (SonoScape 6V1; operating frequency 6–10 MHz) enclosed in a sterile sheath and applied to the anterior abdominal wall, exploiting its superior near-field spatial resolution relative to a standard transabdominal probe (Figures 2–3). Real-time imaging facilitated precise needle trajectory planning, enabling safe negotiation of the needle path to avoid interposed bowel loops, mesenteric vasculature, and other vulnerable structures. A sterile 18-gauge needle was advanced transabdominally under continuous real-time visualization, with follicular aspiration performed using controlled negative pressure of 100 mmHg. This moderate aspiration pressure was calibrated to minimize oocyte trauma whilst ensuring complete evacuation of follicular contents. Under meticulous needle guidance, each follicle was accessed sequentially.

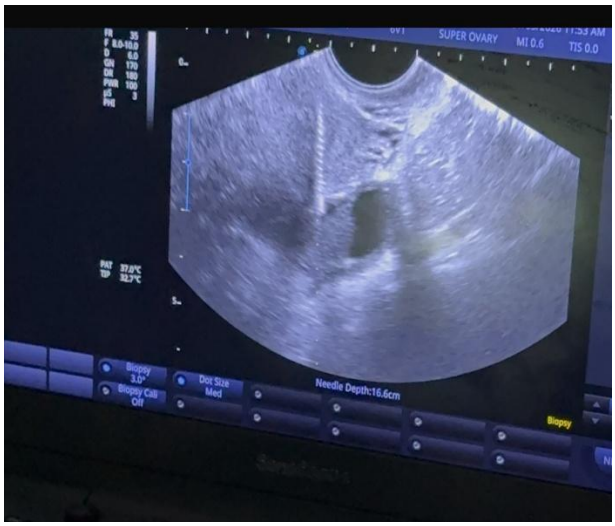

Figure 2: Pre-aspiration follicular targeting. The transvaginal transducer is enclosed in a sterile sheath and applied abdominally to the anterior abdominal wall with the biopsy needle guide active on screen.

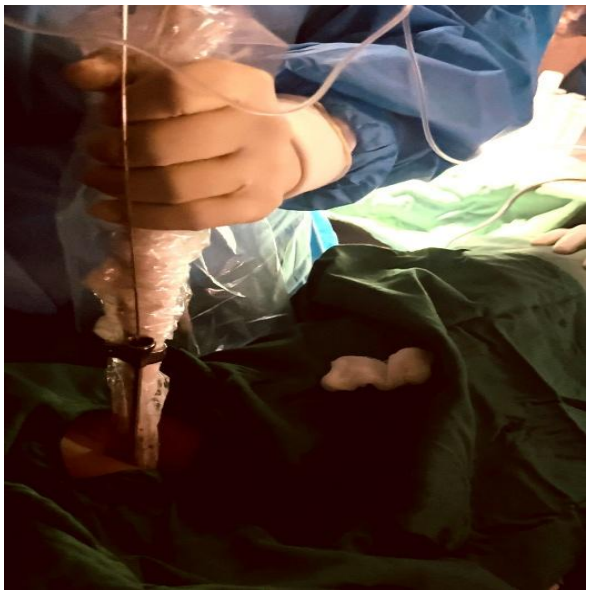

Figure 3: Transabdominal needle insertion. The gloved operator holds the sterile-sheathed transvaginal probe applied to the anterior abdominal wall, with the 18G aspiration needle and follicular aspiration tubing directed transabdominally toward the deeply displaced ovary.

Both ovaries were successfully accessed and aspirated transabdominally without intraoperative complications; no haemorrhage, visceral injury, or vasovagal episode was recorded. A total of five oocytes were retrieved. Embryo assessment demonstrated variable morphology with moderate-to-poor morphological grading and cytoplasmic vacuolation in a proportion of embryos. An elective freeze-all strategy was instituted in view of the patient's adenomyosis-related uterine receptivity concerns, given that adenomyosis is independently associated with reduced implantation rates and poorer IVF outcomes in both fresh and frozen embryo transfer cycles.[9,10] All viable embryos were vitrified for deferred frozen embryo transfer. The patient remained haemodynamically stable throughout and was discharged in satisfactory clinical condition with follow-up planned for embryo review and FET planning.

DISCUSSION

Transvaginal ultrasound-guided oocyte retrieval remains the reference standard in ART, underpinned by its minimally invasive character, reproducibility, and well-established safety profile. Nevertheless, its execution may be technically precluded in patients whose pelvic anatomy has been fundamentally altered by recurrent adhesive disease, advanced endometriosis, uterine adenomyosis, leiomyomata, or prior pelvic surgical interventions. In such cases, bilateral ovarian displacement may render transvaginal follicular puncture either technically infeasible or associated with unacceptable procedural risk, encompassing the clinical scenarios of a frozen pelvis, ovarian transposition, extreme obesity, and markedly distorted pelvic architecture.[2,3,5]

Clinical indications for transabdominal oocyte retrieval (TAOR)

The present case represents a constellation of anatomical barriers that collectively define the clinical scenarios for which transabdominal oocyte retrieval should be considered. TAOR is indicated in patients presenting with:

High or posterosuperiorly displaced ovaries inaccessible via the vaginal fornices; dense pelvic adhesions following prior surgery or severe endometriosis, resulting in bilateral ovarian fixation; large uterine fibroids or pelvic masses obscuring vaginal access; congenital Müllerian anomalies such as MRKH syndrome; vaginal agenesis, severe vaginal stenosis, or neovagina; ovarian transposition after pelvic radiotherapy; distorted pelvic anatomy following multiple cumulative pelvic surgical procedures; and clinical scenarios where transvaginal puncture carries excessive anatomical risk.

Technical approach and safety considerations

Transabdominal oocyte retrieval demands advanced ultrasound-guided procedural skills and thorough appreciation of altered pelvic anatomy in each individual case. Critical technical pearls for safe and effective TAOR execution include: careful pre-procedure sonographic mapping of ovarian position, size, depth, and proximity to bowel loops and vasculature; systematic use of color Doppler ultrasonography to identify and avoid the inferior and superficial epigastric vessels in the anterior abdominal wall; maintenance of the shortest safe needle path whenever possible, reducing peritoneal traversal and thereby lowering bowel injury risk in adhesive disease; strategic use of adjunctive maneuvers such as gentle abdominal wall pressure or judicious bladder filling/emptying to optimize ovarian positioning; and recognition that combined transvaginal and transabdominal retrieval is a viable hybrid strategy when only one ovary proves inaccessible vaginally. The use of existing IVF equipment-specifically, a high-frequency transvaginal transducer applied to the abdominal wall-requires no specialized needle or additional instrumentation beyond standard retrieval needles (17–18 gauge), yet substantially enhances procedural precision and safety.

The present case encapsulated an unusually complex constellation of anatomical and clinical challenges. Iterative pelvic surgery-comprising open myomectomy on two separate occasions and subsequent adenomyomectomy-had culminated in extensive pelvic adhesive disease with pronounced bilateral ovarian fixation and adnexal malposition. Superimposed diffuse uterine adenomyosis contributed to acoustic shadowing that further impaired sonographic delineation of follicular architecture during stimulation monitoring. Conventional transvaginal oocyte aspiration in this setting would have carried a substantially elevated risk of haemorrhagic, visceral, or infectious complications, rendering it clinically inadvisable.

Transabdominal oocyte retrieval was first described as a rescue technique for ovaries inaccessible via the transvaginal route. In a landmark retrospective case-control study by Barton et al encompassing 69 women with inaccessible ovaries, transabdominal follicular aspiration demonstrated comparable fertilization rates, embryo quality, and pregnancy outcomes relative to standard transvaginal retrieval, with only one complication requiring hospitalisation over a 12-year period.[2] More recently, Sönmezer et al specifically compared transabdominal oocyte retrieval using a vaginal probe with the conventional transvaginal approach in a series of 64 patients, confirming its feasibility, effectiveness, and safety as an alternative in patients with inaccessible ovaries.[6] Jia et al reported a highly comparable case of combined transabdominal and transvaginal egg retrieval guided by a vaginal probe in a patient with adenomyosis and a markedly enlarged uterus, further corroborating the applicability of this technique in adenomyosis-related anatomical distortion.[7] Yang et al similarly reported a modified transabdominal oocyte retrieval technique guided by a vaginal ultrasound probe, with a comprehensive literature review supporting its safety and reproducibility across varied clinical contexts.[8]

The distinctive technical contribution of the present case resides in the deliberate adaptation of a high-frequency transvaginal transducer for transabdominal application in a patient with multi-level pelvic distortion. As recently emphasised by Melado et al in their Counter current commentary published in Reproductive BioMedicine Online, reproductive medicine must broaden its procedural repertoire beyond the transvaginal default to offer truly individualised ART care, and transabdominal aspiration constitutes an established, evidence-based modality that should be part of every tertiary unit's procedural toolkit.[5] The physical properties of the transvaginal probe operating at 6–10 MHz with correspondingly superior axial and lateral resolution relative to standard transabdominal probes (typically 2–5 MHz) conferred a meaningful imaging advantage during abdominal scanning. As illustrated sequentially in Figures 1–3, consistent high-quality sonographic visualisation of the deeply displaced ovaries was maintained throughout the procedure, from pre-procedural baseline assessment of adnexal anatomy and ovarian displacement (Figure 1) through follicular targeting with the abdominally applied probe (Figure 2) to active transabdominal follicular aspiration under real-time guidance (Figure 3).

The enhanced imaging resolution was of particular clinical importance given the degree of anatomical distortion. Accurate identification of follicular boundaries, precise needle trajectory determination, and continuous real-time visualisation during aspiration collectively minimised the risk of inadvertent injury to adjacent bowel, mesenteric vasculature, and other pelvic structures. As noted by Melado et al, adjunctive Doppler ultrasonography for pre-procedural vascular mapping is advisable to reduce the risk of injury to the inferior epigastric vessels.[5]

The clinical context of DOR and repeated implantation failure imparted additional urgency to the retrieval strategy. In patients with DOR, the developing follicular cohort is inherently limited, and each individual oocyte assumes disproportionate reproductive importance.[4] Cycle cancellation attributable to retrieval failure in this population is associated with a significant decrement in cumulative live birth potential, considerable patient distress, and substantial economic burden. The transabdominal approach successfully averted cancellation and enabled complete aspiration of the identified follicular cohort.

Transabdominal oocyte retrieval demands advanced ultrasound-guided procedural skills, intimate familiarity with transabdominal needle guidance techniques, and thorough appreciation of the altered pelvic anatomy in each individual case. The risk of bowel injury is theoretically increased when traversing the anterior abdominal wall and peritoneal cavity in the setting of adhesive disease; meticulous pre-procedural sonographic mapping of needle trajectories is therefore mandatory. The procedure should be confined to specialist tertiary ART centres with the requisite infrastructure and personnel expertise to manage potential procedural complications expeditiously.

In summary, this case demonstrates that purposeful adaptation of existing ultrasound equipment—specifically, the transabdominal deployment of a high-frequency transvaginal transducer—can extend the technical scope of oocyte retrieval to patients who would otherwise face cycle cancellation. Innovation in retrieval technique, guided by thorough understanding of the underlying pelvic pathology and a commitment to individualised procedural planning, represents an important dimension of optimising reproductive outcomes in patients with complex adnexal anatomy.

CONCLUSION

Transabdominal oocyte retrieval utilizing an abdominally applied high-frequency transvaginal ultrasound transducer represents a technically viable and clinically effective alternative strategy in patients with severely distorted pelvic anatomy and bilaterally inaccessible ovaries. The superior spatial resolution of the transvaginal transducer enhances procedural precision and safety in anatomically challenging scenarios, as corroborated by the intraoperative imaging sequence presented in Figures 1–3. Meticulous patient selection, thorough pre-procedural sonographic planning including Doppler vascular mapping, and execution by experienced ART clinicians are prerequisites for optimal outcomes. This technique merits inclusion in the procedural repertoire of tertiary reproductive medicine units, with the capacity to avert cycle cancellation and preserve cumulative oocyte yield in poor responders with complex pelvic disease.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

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Cite this article as: Siddiqua A, Ashraf CM, Shafjeer A, Jena SK, Basheer R. Beyond the vaginal route: successful oocyte retrieval using a transabdominally adapted transvaginal ultrasound probe in a frozen pelvis: a case report. Int J Reprod Contracept Obstet Gynecol 2026;15:3312-8.