

Very Low AMH: Spontaneous Conception after Successful IVF/ICSI Pregnancy in a 37-Year-Old Woman

—About a Case and Literature Review

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Abstract

Background: Anti-Müllerian hormone (AMH) is the reference biomarker of ovarian reserve. Extremely low levels are classically regarded as a marker of impending menopause and a predictive factor for failure of assisted reproductive technology (ART) and spontaneous conception. **Case presentation:** We report the case of a 37-year-old nulliparous woman presenting with 15 years of primary infertility and severely diminished ovarian reserve (AMH 0.14 ng/mL, FSH 11.1 IU/L, AFC = 8). Following refusal of donor-oocyte IVF initially recommended, an ultra-short antagonist protocol (ganirelix from cycle day 1) yielded 12 oocytes and 4 grade-A blastocysts. Single embryo transfer resulted in a live birth in July 2023. Twenty-two months post-caesarean, while still breastfeeding, the patient achieved an unassisted spontaneous pregnancy, delivering on 25 February 2026. **Conclusion:** This case challenges the absolute prognostic value of AMH in women under 40 and highlights a potential post-pregnancy “priming” effect on residual ovarian function. Clinicians should avoid using AMH as the sole criterion to deny ART or predict future natural fertility.

Keywords

Anti-Müllerian Hormone, Diminished Ovarian Reserve, IVF/ICSI, Spontaneous Conception, Ultra-Short Antagonist Protocol

1. Introduction

Anti-Müllerian hormone (AMH), produced by granulosa cells in the preantral and antral follicles, is now the reference biomarker of ovarian reserve. It accurately reflects the pool of available primordial follicles and predicts the ovarian response to exogenous gonadotropins during IVF/ICSI stimulation cycles [1] [2].

Quantitatively, AMH is used to anticipate ovulatory response [1], embryonic quality [3] [4], pregnancy and live birth rates [1] [5] [6]. Levels below 1.1 ng/mL [7] or 1.4 ng/mL [8] are frequently correlated with the absence of pregnancy in ART cycles.

However, the correlation between the amount of AMH and the intrinsic quality of oocytes remains a matter of debate, especially in patients under 40 years of age [2] [4]. While AMH is an excellent tool for quantifying the follicular pool, its ability to predict individual oocyte quality is limited.

Recent data also call into question its predictive value for natural fertility: several meta-analyses and prospective studies suggest that very low AMH levels are not significantly associated with a reduction in spontaneous fertility [9]-[12]. Spontaneous pregnancies have even been documented in women with undetectable AMH levels [13] [14].

We report here the case of a 37-year-old woman with severe ovarian reserve depletion (AMH = 0.14 ng/mL) in whom IVF/ICSI with ultrashort antagonist protocol resulted in grade A embryos and a live birth, followed by spontaneous unassisted conception 22 months after delivery. This case illustrates the limitations of AMH as an absolute predictor of fertility and opens the discussion on a possible post-pregnancy “ovarian priming” effect.

2. Presentation of the Case

2.1. First Pregnancy by IVF/ICSI (October 2022-July 2023)

2.1.1. Patient Data

A 37-year-old woman (G0P0) presented for a consultation for primary infertility for a period of 15 years. She had no notable medical history. Endometriosis, ovulatory disorders, pelvic disease have been excluded. After several consultations, for the first time in 2021, the AMH was requested, after 10 years of unexplained infertility. This had determined that the decrease in ovarian reserve is the main obvious clinical explanation for this infertility.

His clinical record included several unsuccessful cycles of clomiphene citrate combined with dydrogesterone, as well as three intrauterine inseminations (IUIs) without conception. Menstrual cycles were regular (28 days), without dysmenorrhea or metrorrhagia. The anthropometric parameters were as follows: weight 72 kg, height 1.72 m, BMI 24.3 kg/m². The gynecological physical examination was unremarkable.

2.1.2. Hormonal Assessment and Assessment of Ovarian Reserve

The initial hormonal assessment carried out on day 3 of the cycle (14 July 2022)

revealed a profound depletion of the ovarian reserve (**Table 1**). The AMH of 0.14 ng/mL was significantly lower than the expected value for her age (1.70 ng/mL), suggesting an ovarian reserve comparable to that of a woman of about 48 years of age. FSH at 11.1 IU/L and estradiol at 132 pg/mL were also abnormal, confirming a greatly diminished ovarian reserve. Thyroid hormones and prolactin were within normal ranges.

Ovarian ultrasound at day 5 showed 4 microfollicles (8 mm) and 1 macrofollicle (15 × 14 mm) on the right, and 2 microfollicles (8 mm) with 1 macrofollicle (13 × 9 mm) on the left. The endometrial thickness was 5.9 mm.

Table 1. Hormonal profile and initial ovarian reserve (14/07/2022, D3 of the cycle).

Parameter	Measured value	Reference values
AMH (ng/mL)	0.14 ↓	1.0 - 2.9
FSH (UI/L)	11.1 ↑	<10
LH (UI/L)	10.4	2.4 - 12.6
Estradiol (pg/mL)	132 ↑	25 - 75
Progesterone (µg/L)	0.24	0.2 - 1.4
CFA (follicles)	8 ↓	>10

↑ value above the reference limits; ↓ value below the reference limits. CFA: count of antral follicles.

2.1.3. Supplementary Infertility Assessment

Hysterosalpingography showed good bilateral peritoneography and the absence of anatomical abnormalities of the fallopian tubes. Infectious serologies (*Mycoplasma spp.*, *Chlamydia trachomatis*, syphilis, HIV, hepatitis B and C) were negative. The partner's spermiogram was normal according to WHO criteria.

2.1.4. Diagnosis

Decreased ovarian reserve was the main obvious clinical explanation for this infertility in a 15-year primary infertile setting.

2.1.5. Therapeutic Decision

Faced with the profoundly diminished ovarian reserve, an Asian hospital initially recommended IVF with egg donation. The couple refused this referral and turned to a European centre, which offered IVF/ICSI with the patient's own gametes.

The first cycle of stimulation was cancelled due to elevated basal estradiol levels (132 pg/mL). An endometrial biopsy was performed and returned with normal histology. An **ultrashort antagonist protocol** (or GnRH antagonist pretreatment protocol) was implemented in the following cycle.

2.1.6. Ovarian Stimulation Protocol

Pretreatment phase (Table 2): Ganirelix (Orgalutran®) 0.25 mg/0.5mL was administered subcutaneously on D1, D2 and D3 of the cycle at 8:45 p.m., rapidly reducing estradiol from 99 pg/mL to 15 pg/mL in 48 hours, and increasing the CFA from 8 to 10 follicles by synchronization of the follicular cohort.

Table 2. Hormonal evolution under antagonistic pretreatment protocol (ganirelix).

Parameter	D1 of the cycle (10/08/2022)	D3 of the cycle (13/08/2022)
AMH (ng/mL)	0.14	Unchanged
FSH (UI/L)	8.0	8.0
LH (UI/L)	11.3	11.3
Estradiol (pg/mL)	99	15 ↓ ↓
Progesterone (µg/L)	0.30	<0.05
CFA (follicles)	8	10 ↑

↑ ↑ rapid decline; ↑ Increase. The fall in estradiol is evidence of effective pituitary suppression.

Stimulation phase and induction (Table 3):

- 1) Day 4 - Day 12: Menotropins (Menopur®) 300 IU s.c. at 8:45 p.m.
- 2) Day 8 - Day 14: resumption of ganirelix 0.25 mg s.c. every morning at 8:00 am.
- 3) Day 15 (02 h 30): double induction by triptorelin (Gonapeptyl®) 0.2 mg s.c. + choriogonadotropin alpha (Ovitrelle®) 250 µg s.c.
- 4) Oocyte puncture performed 36 hours after induction.

Table 3. IVF/ICSI stimulation protocol summary and embryonic results.

Step	Details
Pretreatment	Ganirelix 0.25 mg s.c. – D1 to D3 of the cycle (20:45)
Stimulation	Menotropines 300 IU a.s.d. – D4 to D12 (8:45 p.m.)
Antagonist (reprise)	Ganirelix 0.25 mg s.c. – D8 to D14 (8:00 am)
Shutter release (D15, 02h30)	Triptoréline 0,2 mg s.c. + Choriogonadotrophine alpha 250 µg s.c.
Oocyte puncture	12 oocytes collected, including 8 mature oocytes
Embryonic results	4 grade A embryos (developmental day 5)
Endometrial thickness	10 mm at the time of transfer
Embryo transfer	1 embryo transferred fresh; 3 cryopreserved embryos
Luteal Support	Vaginal progesterone 400 mg morning and evening
Issue	Live birth in July 2023 (boy, 3200 g, Apgar 8/9/10)

2.2. Second Pregnancy - Spontaneous Conception (July 2025-February 2026)

Twenty-two months after the first caesarean section, while the patient was still breastfeeding her first child, she consulted for a two-day delay in her period, unusual in her own words. A plasma β -HCG assay, performed on July 7, 2025, came back positive at 7181 mIU/mL, corresponding to a pregnancy of 4 weeks + 4 days of amenorrhea (WA). No medical intervention or assisted reproduction had been performed.

A 48-hour control assay (July 9, 2025) confirmed a doubling of β -HCG to 11,922 mIU/mL (4 WA + 6 days), indicating the normal course of pregnancy. An early ultrasound performed confirms the presence of a progressive intrauterine monoembryonic pregnancy of 7 weeks of amenorhea (July 26, 2025). The patient was put on folic acid 0.4 mg/day and vaginal progesterone 400 mg $\times$ 2/day. The prenatal follow-up was uncomplicated. On February 25, 2026, she delivered a healthy male newborn by caesarean section (weight: 3220 g, Apgar score: 8/9/10).

Ethical note: the patient's data has been fully anonymized. His written informed consent was obtained prior to any use for publication purposes.

3. Discussion

3.1. IVF/ICSI and Ultrashort Antagonist Protocol

The ICSI technique was favoured in our case to maximize the chances of fertilization even in the absence of an obvious male factor. In fact, studies have shown that ICSI achieves a significantly higher fertilization rate than conventional IVF [15]. This justifies the use of ICSI in order to guarantee better management when a risk of failure is identified.

The ultrashort antagonist protocol was preferred for its simplicity, shorter treatment duration and reduced risk of ovarian hyperstimulation. It offers better management of patients, especially those with low ovarian reserve or who have previously shown an insufficient ovarian response, as it reduces the duration of stimulation and gonadotropin dosing [16].

By combining IVF/ICSI with an ultrashort antagonist protocol, a shorter and better controlled ovarian stimulation is achieved [17], suitable for patients with a poor response or particular characteristics. ICSI increases the chances of fertilization when the risk of failure is high with conventional IVF. This strategy seeks to optimize outcomes by reducing treatment time, costs, and risks, while maximizing the chances of reproductive success in complex situations [16] [17]. Thus, unlike conventional IVF which might have a higher failure rate in the case of impaired fertility or poor ovarian response, and a longer standard antagonist protocol, this ultrashort approach combined with ICSI is preferred to offer an optimal balance between efficacy and safety.

The therapeutic choice played a decisive role in the success of the stimulation. The ultrashort antagonist protocol, by administering ganirelix on day 1 of the cycle, fulfilled two essential functions:

- **Suppression of asynchronous rise:** In patients with elevated FSH, a dominant follicle may emerge prematurely as early as the luteal phase of the previous cycle. The pretreatment antagonist immediately “calms” the pituitary axis, allowing the entire follicular cohort to start from a homogeneous starting level [5] [18].
- **Fall in basal estradiol:** basal hyperestrogeny (132 pg/mL), a risk factor for early luteinization and poor oocyte quality, was normalized within 48 hours (15 pg/mL), creating biochemical conditions more favorable for folliculogen-

esis [5] [18].

The first cycle of stimulation was cancelled due to elevated basal estradiol levels (132 pg/mL). An endometrial biopsy was performed and returned with normal histology; This endometrial biopsy was performed to rule out an underlying endometrial pathology (such as chronic endometritis or hyperplasia) that could explain a defective implantation or stimulation failure. Its normal result made it possible to repeat the second cycle with the same protocol without therapeutic modification [19].

The ultrashort antagonist protocol offers shorter, better-controlled ovarian stimulation, with efficacy comparable to long protocols in terms of live birth rate, while reducing the risk of hyperstimulation and drug burden. It therefore appears to be a favorable alternative, particularly suitable for patients at risk or with low ovarian reserve, without compromising embryonic quality or overall clinical results [16] [17] [20].

This protocol, although not yet standardized in all centers, deserves to be considered systematically in patients with high FSH and decreased ovarian reserve.

3.2. Very Low AMH and Oocyte Quality: Two Distinct Dimensions

Several authors have already observed this phenomenon: AMH, a marker of the quantitative follicular pool, does not directly reflect intra-oocyte mechanisms of quality, DNA repair or meiotic competence [2] [4]. Instead, we will have to count on the unexpected ovarian and embryonic result.

The unexpected ovarian and embryonic result was:

- 8 mature oocytes retrieved,
- A fertilisation rate (favoured by oocyte maturity and incubation conditions) was 8 out of 12 oocytes, *i.e.* 66%
- the proportion of embryos evolving into grade A blastocysts (J5) according to the international classification of Gardner and Schoolcraft was 4.

These parameters combined provide an objective framework for analyzing oocyte and embryo quality in IVF cycles [21]-[24].

This result shows:

- Quantitative and maturity criteria

The oocyte cohort: 8 mature oocytes recovered. Maturity (Metaphase II stage) is the first indicator of the intrinsic quality of oocytes [21] [24].

- Kinetic and viability criteria (Fertilization rate) [21] [23]

The fertilisation rate is 66%: It is calculated by the ratio between the number of correctly fertilised oocytes and the total number of mature oocytes incubated

This rate is directly influenced by the maturity and intrinsic oocyte competence and the physicochemical conditions of incubation in the assisted reproduction laboratory.

- Embryonic morphological criteria (Development)

This is the ability of embryos to reach the blastocyst stage (D5/D6). An evaluation of the morphological gradation of the embryo is then carried out, allowing

the embryos to be sorted by quality grades.

In our case, we have four grade A blastocysts, which testify to excellent development competence and a maximum probability of successful implantation. This result was “unexpected”.

These grade A blastocysts are essential for maximizing the chances of success in embryo transfer [21].

This result reminds us of a crucial point: AMH (Anti-Müllerian Hormone) is an excellent quantitative marker (the pool of follicles), but it does not directly reflect quality. It does not predict subtle intraocyte mechanisms such as DNA repair or meiotic competence.

These combined parameters (maturity + fertilization rate + morphological grade) remain the best tools in the laboratory to assess the real quality of your oocytes and embryos, regardless of the initial ovarian reserve.

Some clinical evidence:

Tocci *et al.* [25] reported a live birth after ICSI in a woman with a serum AMH level that was almost undetectable (<0.5 ng/mL), previously pretreated with oral contraceptives. The production of high-quality embryos in this context is consistent with our observation and argues that the AMH level alone is not an exclusion criterion for IVF with clean gametes.

A systematic review and meta-analysis by Peigné *et al.* [26], involving 32 studies, found a positive but non-linear relationship between AMH and cumulative rates of live births in IVF/ICSI, without identifying a threshold below which treatment should be refused.

The most salient aspect of this report is the occurrence of a spontaneous pregnancy in a woman with an AMH level of 0.14 ng/mL. This result is not isolated in the literature.

The meta-analysis by Lin *et al.* [9], involving 11 studies (4388 women), found no significant association between AMH levels and the likelihood of spontaneous conception, regardless of age.

Fraisse *et al.* [14] documented a progressive pregnancy in a woman with undetectable AMH.

The prospective studies of Steiner *et al.* [10], Depmann *et al.* [11] and Zarek *et al.* [12] confirm that AMH does not predict time to conception in women who do not have ART.

More recently, Fu *et al.* [13] reported the case of a 35-year-old woman with negligible AMH who conceived spontaneously on three occasions, giving birth to four children including twins.

These observations converge to suggest that spontaneous fertility can be maintained in some women despite a quantitatively zero ovarian reserve.

3.3. The Hypothesis of the Post-Pregnancy “Ovarian Priming” Effect

It is conceivable that pregnancy may have a “trigger” effect on the functioning of

the ovaries, which can affect the remaining ovarian reserve or future follicular dynamics. This theory is based on clinical and biological observations that suggest that hormonal and physiological changes occurring during and after pregnancy could influence ovarian activity [27]-[29]. These include:

- Neuroendocrine changes after delivery: variations in prolactin, decreased estrogen after delivery, and gradual recovery of the hypothalamic-pituitary-ovarian axis could open a “recruitment window” for the remaining primordial follicles [9] [14].
- Possible improvement in ovarian blood circulation: Pregnancy and the postpartum period are associated with neovascularization and increased blood flow to the ovaries, which could promote the maturation of the last available follicles [10].
- Reduction of psychological stress: the resolution of prolonged infertility (15 years) by live birth decreases chronic stress, a well-documented negative factor on GnRH secretion and folliculogenesis [10].

However, it is crucial to note that these data are mainly correlational and that a cause-and-effect relationship between pregnancy and a lasting change in the state of ovarian reserve has not been definitively proven [27] [28].

Consequently, this proposal should be considered as a line of research requiring rigorous prospective studies to shed light on the underlying mechanisms and verify whether pregnancy can indeed initiate processes that promote or modulate the resumption or persistence of ovarian function. Therefore, any clinical or therapeutic interpretation based on this concept must remain cautious pending formal confirmation of this hypothesis [13] [27]-[29].

3.4. Clinical Implications

Our findings are consistent with an emerging consensus message: AMH, as useful as it is for planning ART cycles, should not be used as the sole criterion for refusing treatment or definitively prognosticating the absence of natural fertility [9]-[12] [26]. Each patient must benefit from an individualized approach integrating the age, the CFA, the clinical history and the preferences of the couple.

3.5. Limitations of the Study

This report outlines the inherent limitations of single case design:

- The impossibility of generalizing the results to all patients with low AMH.
- The absence of a repeated dosage of AMH in the postpartum period, which would have made it possible to objectify a possible transient recovery of the ovarian reserve.
- The presence of non-measurable confounding factors (diet, physical activity, microbiome, allostatic load, etc.).
- The specific role of breastfeeding on residual ovarian function cannot be determined with certainty.

4. Conclusions

This case demonstrates that a very low AMH level is not synonymous with absolute infertility. In a young woman with severe ovarian reserve depletion, a rigorously adapted stimulation protocol can result in high-quality embryos and a live birth. The subsequent occurrence of spontaneous unassisted conception suggests the existence of a “priming” effect of the first pregnancy on residual ovarian function.

AMH should be interpreted as a quantitative tool for managing ART cycles, not as an absolute determinant of oocyte quality or future fertility. Clinicians should avoid using AMH alone to refer a patient to egg donation or deny her any prospect of natural conception.

Prospective multicentre studies are needed to quantify the prevalence of spontaneous post-IVF conception in women with low AMH, and to better elucidate the biological mechanisms underlying the transient restoration of postpartum ovarian function.

Patient Consent

The patient’s written informed consent was obtained for the publication of this case report, including all the clinical, biological and therapeutic data presented.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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List of Abbreviations

AMH	Anti-Müllerian Hormone
ART	Assisted Reproductive Technology
IVF	In Vitro Fertilization
ICSI	Intracytoplasmic Sperm Injection
CFA	Antral Follicle Count
IOP	Premature ovarian failure
FSH	Hormone Folliculo-Stimulante
LH	Luteinizing hormone
HCG	Human Chorionic Gonadotropin
WA	Weeks of amenorrhea
BMI	Body Mass Index
IUI	Intrauterine insemination
