International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Bakshi VA et al. Int J Reprod Contracept Obstet Gynecol. 2026 May;15(5):1785-1787
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20261286

Case Series

Controlled ovarian stimulation in women with very high AMH-balancing yield, quality and safety: a case series

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Received: 14 March 2026
Revised: 13 April 2026
Accepted: 14 April 2026

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ABSTRACT

Anti-müllerian hormone (AMH) is widely used as a marker of ovarian reserve and a predictor of ovarian response during controlled ovarian stimulation in assisted reproductive techniques. While its role in predicting oocyte yield is well established, its association with embryo quality and developmental potential remains debated. This retrospective case series describes outcomes in three women undergoing IVF/ICSI with AMH levels >20 ng/ml, aiming to illustrate variability in response despite similar hormonal profiles. All patients underwent antagonist protocols with agonist trigger to reduce the risk of hyperstimulation. High yield of oocytes (19–34) and satisfactory fertilization rates (63–80%) were demonstrated by all. Day 3 conversion rates were high, however, blastocyst yield and quality varied. This reflected differences in oocyte morphology and developmental competence. Variability in oocyte quality and blastocyst formation among patients with similarly elevated AMH levels highlights the multifactorial nature of embryo competence.[3] AMH should therefore be interpreted alongside age, oocyte morphology, and stimulation parameters, rather than as a sole predictor of embryological or clinical outcomes.

Keywords: Anti mullerian hormone, Polycyctic ovarian syndrome, Controlled ovarian hyperstimulation, Embryo, Oocytes, Invitro fertilisation

INTRODUCTION

Anti-müllerian hormone (AMH) is produced by granulosa cells of small antral follicles and serves as a quantitative indicator of ovarian reserve. It is used in planning of IVF cycles to anticipate the ovarian response to stimulation. Meta-analyses have demonstrated that AMH, like antral follicle count, effectively predicts high or poor responses to stimulation.[1]

Although AMH reliably predicts the number of retrieved oocytes, its ability to predict embryo quality, blastocyst formation, and clinical pregnancy outcomes is less clear, with some studies reporting positive correlations and others finding limited predictive value.[2] This case series describes clinical and embryological outcomes in three patients with very high AMH (>20 ng/ml) to illustrate variability in response to stimulation and embryo development.

CASE SERIES

Retrospective case series from a tertiary reproductive medicine centre. Three women undergoing IVF/ICSI with AMH >20 ng/ml, confirmed biochemically prior to stimulation.

Antagonist protocol with tailored gonadotropin dosing and antagonist administration to mitigate hyper response, followed by agonist trigger injections.

All three patients presented with no detectable male factor or other recognized causes of subfertility.

Outcomes assessed

Total oocytes retrieved and maturational status (MII/MI/GV/Abnormal forms),

Embryo development and quality (Day 3 cleavage stage grading),

Blastocyst formation and grading (Day 5/Day 6)

Oocytes fertilised: Number of oocytes that successfully fertilised out of total retrieved.

Fertilization rate: (Oocytes fertilised÷Total oocytes retrieved)×100.

Day 3 conversion (%): (Day 3 embryos÷Fertilised oocytes)×100.

Day 3 embryos: Number with morphological grades.

Day 5 blastocysts: Number with grades.

Details of Patients A, B and C are as follows:

Table 1: Controlled ovarian stimulation.

Patient (age, years)	Recombinant FSH dose	Cetrorelix (doses)	Oocytes retrieved (N)	MII (N)	MI (N)	GV (N)	Zona rupture (N)	Comments
A (33)	225 IU×10	4	20	14	4	2	0	No resistance during denudation; granular cytoplasm; debris in perivitelline space; poor-quality oocytes
B (36)	225 IU×11	6	34	22	7	4	1	Adequate resistance during denudation
C (32)	150 IU×9	5	19	11	4	3	1	No resistance during denudation; granular cytoplasm; debris in perivitelline space; highly fragmented polar bodies; poor-quality oocytes

Table 2: Embryo formation details.

Patient	Oocytes fertilised	Fertilization rate	Day 3 embryos (A/B/C)	Day 3 conversion (%)	Day 5 blastocysts
A	16/20	80%	15 (11A, 4B, 0C)	94	4 (3A, 1B)
B	24/34	71%	24 (12A, 8B, 4C)	100	14 (AA, AB)
C	12/19	63%	12 (6A, 3B, 3C)	100	2 (B)

Table 3: Frozen embryo details.

Patient	Frozen day 3 embryos	Frozen blastocysts	Total frozen embryos
A	3 (Grade A)	4 (3A, 1B)	7
B	0	14 (AA, AB)	14
C	3 (Grade A)	2 (Grade B)	5

All patients were discharged after 24 hours of observation without any complication, with appropriate preventive measures taken to avoid OHSS, and were subsequently followed up. No cases of severe OHSS were observed among the patients.

DISCUSSION

All three patients exhibited strong ovarian responses, with high numbers of retrieved oocytes - consistent with AMH's utility as a predictor of quantitative COS outcomes. AMH reflects the pool of recruitable follicles and helps tailor stimulation protocols, particularly in patients at risk for hyper response. Such patients require individualized gonadotropin dosing to achieve an optimal ovarian response.[3] High AMH levels correlated with a high number of embryos formed, particularly cleavage-stage embryos.

This aligns with previous findings showing AMH's positive correlation with the number of good-quality embryos and blastocysts. The strong blastocyst cohorts in Patient A and B further supports this association. However, Patient C - with notable oocyte dysmorphisms and slightly fewer blastocysts - highlights variability in embryo progression despite high initial AMH and oocyte numbers. While AMH is a reliable marker of ovarian reserve and response, evidence on its predictive value for

embryo quality and clinical pregnancy is mixed.[4] Some studies show positive correlations between AMH and embryological outcomes, while others have reported weak or non-significant associations when controlling for age and other factors.[5] It is likely that embryo competence reflects multiple factors including follicular environment, oocyte quality, patient age, and stimulation protocols.

CONCLUSION

In this case series of three patients with AMH >20 ng/ml, robust ovarian responses with high oocyte yields were observed, and each patient achieved multiple good-quality embryos and blastocysts. These findings support AMH's role as a valuable quantitative predictor of ovarian response in IVF/ICSI. However, variable patterns in embryo development underscore the multifactorial nature of embryo competence and the need for a comprehensive approach to prognosis and patient counselling. Understanding AMH's strengths and limitations helps clinicians counsel patients realistically. High AMH can inform expectations regarding oocyte yield and inform stimulation dose adjustments, but it should not be the sole predictor of embryo quality or clinical success.

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

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Cite this article as: Bakshi VA, Desai G, Gotluru MV. Controlled ovarian stimulation in women with very high AMH- balancing yield, quality and safety: a case series. Int J Reprod Contracept Obstet Gynecol 2026;15:1785-7.