

The impact of uterine artery embolization on ovarian reserve: A systematic review and meta-analysis

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INTRODUCTION

- Uterine artery embolization was first introduced in 1995. Since then, it has established itself as a minimally invasive and uterus-sparing treatment option for premenopausal women with symptomatic fibroids.
- However, the impact of UAE on ovarian function remains controversial.
- It has been postulated that unintended embolization of the utero-ovarian collateral circulation during UAE could impair the blood supply to the ovaries with subsequent decline in ovarian reserve.
- However, studies using anti-Müllerian hormone (AMH) as a marker for ovarian reserve revealed no significant decline in ovarian reserve after UAE.

AIM

- The aim of this systematic review and meta-analysis was to investigate the impact of uterine artery embolization on ovarian reserve as determined by circulating serum AMH levels.

METHODS

- This study was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines.
- An extensive electronic database search was performed to identify research articles published between January 2000 and December 2018, on the impact of UAE on ovarian reserve as determined by serum AMH concentration.
- All the identified papers were screened for relevance. Relevant studies were read in full for eligibility according to inclusion/exclusion criteria.
- The quality and risk of bias of the included studies were assessed using a modified Newcastle-Ottawa scale.
- Pre- and post-embolization data including mean \pm SD serum concentrations AMH (ng/mL) and FSH (IU/L) and ovarian volume were extracted from the individual studies and entered into Review Manager version 5.1 software.

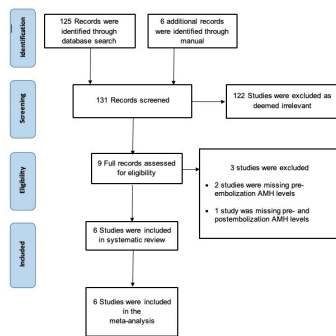


Figure 1: PRISMA flow diagram

RESULTS

- Six studies were included in the initial analysis. Characteristics of the included studies can be found in the table below.

Author	Country	Design	n	Age (mean \pm SD)	Laterality and method of UAE	Dominant fibroid volume (mL)	Follow up (mo)	AMH kit	Secondary outcomes (ovarian reserve markers)
Torre et al., 2014	France	Prospective cohort	64	37.3 \pm 3.9	Bilateral (Tris-acryl microspheres 500-1200 μ m)	97 \pm 103	3, 6, 12*	NS	FSH, LH, E ₂ , AFC, OV, fertility
Keshavarzi et al., 2015 [†]	Iran	Case-control	20	34.6 \pm 3.9	NS	NS	6	Monoblonal kit	–
Kim et al., 2016	South Korea	Retrospective cohort	32	39.4 \pm 4.8	Bilateral (gelatin sponges) [‡]	265.26 \pm 339.0	3, 12	NS	FSH, LH, E ₂ , AFC, OV
McLucas et al., 2017	USA	Prospective cohort	87	35.5 \pm 3.8	Bilateral (PVA \times 500 μ m)	NS	Variable [§]	NS	–
Tsikouras et al., 2017	Greece	Case-control	120	43.6 \pm 2.05	Bilateral (Hydrogel coated microspheres 700-900 μ m)	NS	1, 3, 6, 12	NS	FSH, LH, E ₂
Czuczwar et al., 2018	Poland	Case-control	30	35 (33-40)	Bilateral (PVA)	108.5 \pm 12.6	3	ELISA (USCN-EPO228Hu)	FSH, AFC, inhibin B, E ₂

Abbreviations: AFC, antral follicle count; AMH, anti-Müllerian hormone; E₂, estradiol; ELISA, enzyme-linked immunosorbent assay; FSH, follicle-stimulating hormone; LH, luteinizing hormone; NS, not specified; OV, ovarian volume; PVA, polyvinyl alcohol.
*First follow up was 2 weeks after surgery.
[†]Gelatin sponge 500-710 μ m then changed to 710-1000 μ m.
[‡]190 \times 290 days.

Overall pooled results for all studies

Analysis of all 6 studies including 353 participants showed no significant change in post-embolization serum AMH concentrations (WMD -0.60 ng/mL; 95% CI -1.51 to 0.31). Heterogeneity between studies was high ($I^2 = 94\%$).

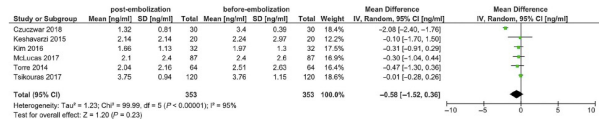


Figure 2: WMD in serum AMH concentrations after UAE for symptomatic uterine fibroids: pooled results for all 6 studies

Subgroup analysis

According to age of participants

- Pooled analysis of the 3 studies including participants aged ≤ 40 years ($n = 71$) showed no significant change in post-embolization serum AMH concentrations (WMD -0.93 ; 95% CI -2.39 to 0.53 ; $I^2 = 91\%$).
- Pooled analysis of the 2 studies including participants aged > 40 years ($n = 131$) revealed no significant change in post-embolization serum AMH levels (WMD -0.10 ; 95% CI -0.92 to 0.09 ; $I^2 = 0\%$).

According to duration of follow up

- Pooled results of 4 studies ($n = 246$) showed no significant drop in serum AMH concentration at 3 months after embolization (WMD -0.21 ; 95% CI -0.52 to 0.10 ; $I^2 = 96\%$).
- Analysis of 3 studies ($n = 204$) with 6 months follow up showed no statistically significant difference in post-embolization serum AMH concentration (WMD -0.17 ; 95% CI -0.43 to 0.13 ; $I^2 = 0\%$).
- Analysis of 3 studies ($n = 214$) with 12 months follow up revealed no statistically significant difference in post-embolization serum AMH concentration (WMD -0.09 ; 95% CI -0.32 to 0.14 ; $I^2 = 0\%$).

CONCLUSION

- Uterine artery embolization does not seem to affect ovarian reserve, as measured by AMH and FSH levels. Given the low quality of studies included in this review, further research is needed with a larger population of women under 40 years of age to allow a firm conclusion to be drawn.

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DECLARATION

- The authors have no conflict of interest.