

Perinatal Outcomes of Piezo-ICSI Versus IVF Following Vitrified-Warmed Single Blastocyst Transfer: A Retrospective Cohort Study

Authors: *Kenichiro Hiraoka,¹ Kiyotaka Kawai¹

1. Kameda IVF Clinic Makuhari, Chiba City, Japan

*Correspondence to ken.msn.hiraoka@gmail.com

Disclosure: The authors have declared no conflicts of interest.

Acknowledgements: The authors would like to thank the clinical and laboratory staff for their support.

Keywords: IVF, perinatal outcomes, Piezo-assisted intracytoplasmic sperm injection (Piezo-ICSI), sex ratio.

Citation: EMJ Repro Health. 2026;12[1]:49-50
<https://doi.org/10.33590/emjreprohealth/549786Y6>

BACKGROUND AND AIMS

Piezo-assisted intracytoplasmic sperm injection (Piezo-ICSI) has gained increasing attention as an alternative fertilisation method designed to minimise mechanical trauma to the oolemma and improve oocyte survival. While its laboratory advantages are becoming well recognised, evidence regarding its perinatal safety remains limited. Conventional IVF, which allows natural sperm–oocyte interaction, continues to serve as the benchmark for evaluating the safety of emerging fertilisation techniques. This review summarises findings from a large retrospective cohort study comparing perinatal outcomes following vitrified-warmed single blastocyst transfer after Piezo-ICSI versus IVF, providing important clinical insights into the safety profile of Piezo-ICSI in contemporary assisted reproductive technology (ART) practice.¹

MATERIALS AND METHODS

The study analysed 3,605 single-blastocyst transfer cycles performed between 2016–2023 across two centers, including 1,732 IVF cycles and 1,873 Piezo-ICSI cycles. Women under 40 years of age were

included. Multivariable logistic regression adjusted for maternal age, male partner age, BMI, ovarian reserve, reproductive history, and previous ART cycles. Perinatal outcomes assessed included pregnancy and miscarriage rates, delivery rates, obstetric complications, monozygotic twinning, gestational age, birth weight, congenital anomalies, and neonatal sex ratio.

RESULTS

Clinical outcomes were comparable between the two groups. Pregnancy rates (48.4% versus 49.4%), miscarriage rates (18.7% versus 19.8%), and delivery rates (38.0% versus 38.6%) showed no significant differences between IVF and Piezo-ICSI, respectively. Obstetric complication rates were also similar (21.1% versus 21.6%). Among infants born (668 in IVF; 733 in Piezo-ICSI), no significant differences were observed in monozygotic twinning (1.3% versus 1.4%), mean birth weight (3,024.6 g versus 3,008.5 g), gestational age at delivery (39.04 versus 39.00 weeks), or congenital anomaly rates (2.4% versus 1.5%). These findings collectively support the perinatal safety of Piezo-ICSI, aligning with emerging evidence from smaller studies.

A notable finding was a significantly higher proportion of female infants in the Piezo-ICSI group compared with IVF (52.5% versus 43.1%). The biological basis for this difference remains unclear. Possible explanations include subtle variations in sperm selection or oocyte activation mechanisms inherent to Piezo-assisted injection. However, the possibility of a chance finding cannot be excluded, particularly given the large number of comparisons performed. Further mechanistic and multicentre studies are warranted to determine whether this sex ratio shift reflects a reproducible biological phenomenon or statistical variation.

LIMITATIONS

The study's retrospective design and the absence of a conventional ICSI comparison group represent limitations. Nonetheless, the large sample size, standardised single-blastocyst transfer approach, and comprehensive perinatal assessment strengthen the reliability of the findings. Importantly, the results provide reassurance for clinicians considering Piezo-ICSI as a primary fertilisation method, particularly in settings aiming to optimise oocyte survival while maintaining perinatal safety.

CONCLUSION

In conclusion, Piezo-ICSI demonstrates perinatal outcomes comparable to IVF in a large real-world cohort. While the increased proportion of female births merits further investigation, the overall findings support the clinical safety of Piezo-ICSI in modern ART practice.

References

1. Hiraoka K et al. Perinatal outcomes of Piezo-ICSI versus IVF following vitrified-warmed single blastocyst transfer: a retrospective cohort study. Abstract L26/P 132. ESHRE Annual Meeting, 5-8 July, 2026.