

# Real-time ultrasound-guided cerclage tension adjustment during modified laparoscopic cervicoisthmic cerclage

Yusuke Suzuki<sup>1</sup>, Kohei Seo<sup>1</sup>, Ayumi Okuyama<sup>1</sup>, Tetsuya Ishikawa<sup>2</sup>, Katsufumi Otsuki<sup>2</sup>, Akihiko Sekizawa<sup>3</sup>, Kiyotake Ichizuka<sup>1</sup>

<sup>1</sup> Department of Obstetrics and Gynecology, Showa Medical University Northern Yokohama Hospital, Yokohama, Japan

<sup>2</sup> Perinatal Center, Showa Medical University Koto Toyosu Hospital, Tokyo, Japan; <sup>3</sup> Department of Obstetrics and Gynecology, Showa Medical University School of Medicine, Tokyo, Japan

## Why mLC?

mLC combines high-level cervicoisthmic support with a minimally invasive, perfusion-conscious surgical approach.

### High-level support

High isthmic placement helps prevent early lower-segment effacement.

### Stable fixation

Anchoring the tape to supporting ligaments reduces suture migration.

### Minimally invasive

The laparoscopic approach may reduce surgical morbidity and recovery time.

### Perfusion-conscious

The tape is placed lateral to the uterine arteries, avoiding direct arterial manipulation.

## Clinical challenge

Although mLC provides strong support, there is no objective standard for the optimal cerclage tension.

**Too loose** insufficient support ——— **Tension trade-off** ——— **Too tight** reduced perfusion

## Objective

To evaluate whether preservation of uterine artery end-diastolic flow—without AEDF/REDF—can serve as a real-time endpoint for tension adjustment, while maintaining fetal and uteroplacental circulation.

## Study design

- Retrospective observational study
- Of 57 patients who underwent mLC and subsequently delivered, 38 with complete Doppler data were included.
- Study period: April 2020 to February 2026
- Perioperative UtA Doppler: PSV, EDV, MDV and PI
- Postoperative follow-up: MCA, UA, DV and UtA Doppler

## Real-time Doppler-guided adjustment

Gradually tighten the slip-knot while monitoring uterine artery diastolic flow.

Cerclage tension was adjusted to maintain uterine artery end-diastolic flow without AEDF/REDF.

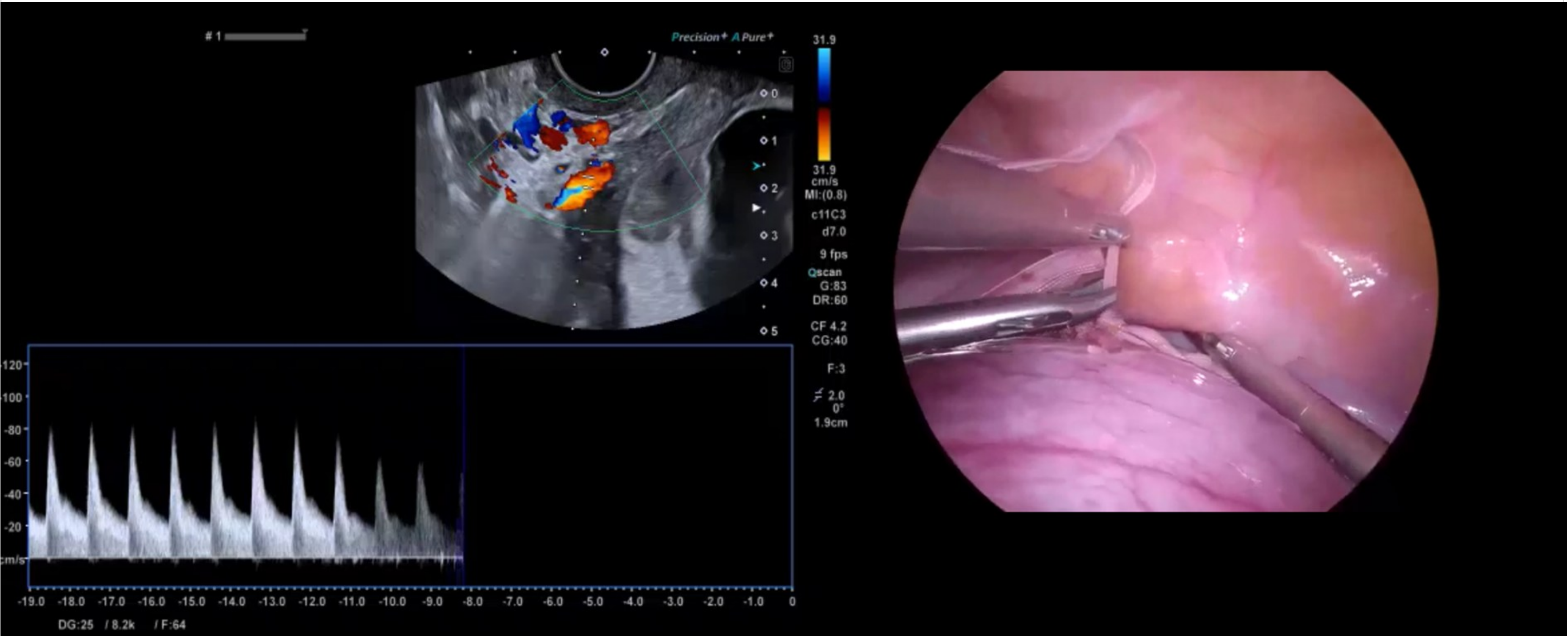
After anesthesia PSV ↓ EDV ↓ PI ↑ transient perfusion-pressure change

After cerclage placement PSV ↓ EDV ↓ PI ↑ transient vascular resistance increase

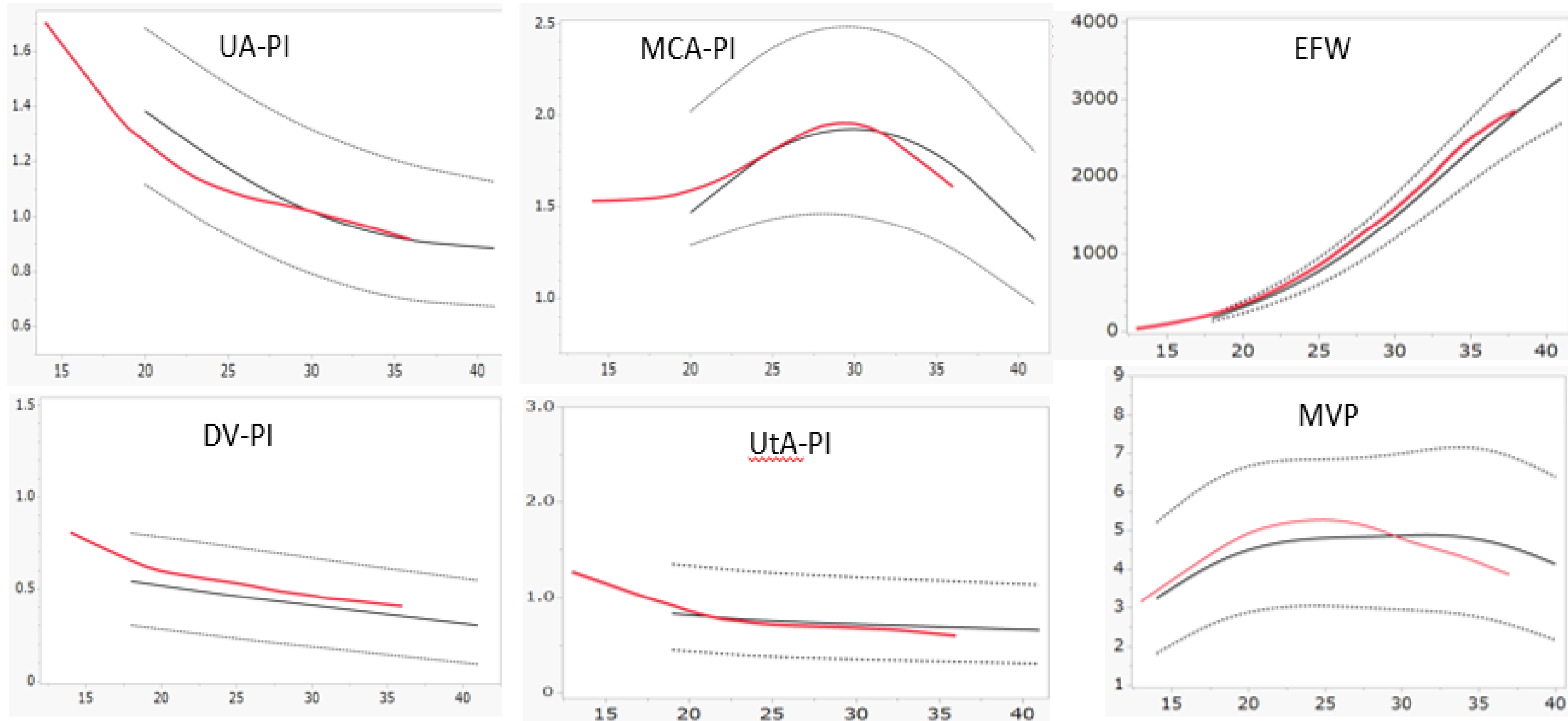
Before discharge PSV ↑ EDV ↑ PI ↓ recovery toward baseline

AEDF/REDF: 0/38 cases  
diastolic flow preserved in all cases

## Real-time Doppler-guided adjustment of cerclage tension



## Postoperative fetal and uteroplacental circulation



## Perinatal outcomes

Median GA at delivery  
**37 weeks**

Birth weight  
**2498 g**

Apgar score  
**8 / 9**

Umbilical artery pH  
**7.283**

## Key Interpretation

Absence of AEDF/REDF indicated preserved perfusion, with only transient Doppler changes and sufficient mechanical support for pregnancy continuation.

## Limitations

Retrospective design, small sample size, and lack of a control group using conventional tension adjustment.

## Conclusion

- Preserved uterine artery diastolic flow may serve as an objective intraoperative endpoint for mLC cerclage tension adjustment.
- This strategy appears to achieve adequate cervical support while maintaining fetal and uteroplacental circulation.