Manual Uterine Displacement Does Not Always Increase the Inferior Vena Cava Cross-Section Area After Subarachnoid Injection of Local Anesthetics for Caesarean Section.

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Background

The inferior vena cava (IVC) in the parturient is compressed by enlarged uterus, which is thought to be one of the causes of hypotension after subarachnoid local anesthetic injection (SI).

Aortocaval decompression maneuvers, such as left lateral tilt of 15° or leftward manual uterine displacement (MUD)[1], are widely adopted during Caesarian section (CS) to reduce assumed IVC compression by the pregnant uterus in the supine position.

Recent magnetic resonance imaging study[2] shows that a 15° left lateral tilt is not a sufficient relief from the IVC compression in term parturient, and the dogma is in controversy. The MUD is another measure to avoid IVC compression, however, there is no study showing IVC decompression by it under spinal anesthesia for CS.

Objective

The purpose of this study is to evaluate the effect of MUD by measuring IVC cross-section area (IVCCA) using ultrasonography in parturients who undergoes spinal anesthesia for caesarean section.

Materials & Methods

- 88 full term Japanese pregnancies receiving elective CS under spinal anesthesia were included in this study from January to November 2017.
- We performed four times of measurements of the end-expiratory IVCCA.

1. Before anesthesia (supine position)
2. 3 minutes after SI
3. After applying MUD (3-6 minutes after SI)
4. After operation

- To obtain IVCCA, we used planimetry with a sector probe (S-Nerve™ FUJIFILM SonoSite Japan) at epigastric fossa.
- We defined 20% change of IVCCA or more compared to the prior one as significant.
- IVCCAs were measured by same doctor. All data are digitally preserved.

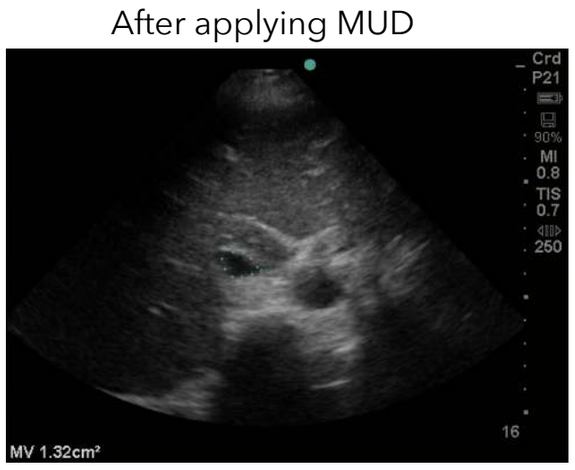
Results

All the enrolled patients' characteristics were the followings;
Age: 35±4.5 yr, Weight: 65±12.2 kg, Height: 158±6.3 cm.

Fig.1. Ultrasound images of a 39-year-old pregnant woman

Before anesthesia

After applying MUD



3minutes after SI

After operation

Fig.2. The effect of MUD in 65 patients whose IVCCAs were measurable after applying MUD

88 pregnant women

- Immeasurable before anesthesia:12
- Immeasurable 3minutes after SI : 3

Measurable 3minutes after SI : 73 — ***P* = 0.023**

Before anesthesia	3minutes after SI	After operation
1.33(0.82-2.09)cm²	1.00(0.61-1.58) cm²	2.74(2.76-3.58) cm²

Immeasurable after applying MUD : 8

Measurable after applying MUD : 65

MUD effective: 26 (40%) — ***P* = 0.63**

IVCCA of "3minutes after SI"	IVCCA of " after applying MUD"
1.00(0.65-1.58) cm²	1.15 (0.57-1.85) cm²

Fig.3. The effect of MUD in 29 patients whose IVCCAs decreased more than 20% and were measurable after applying MUD

Measurable 3minutes after SI : 73

IVCCA decreased more than 20% : 35

Immeasurable after applying MUD : 6

Measurable after applying MUD : 29

MUD effective: 17 (59%) — ***P* = 0.01**

IVCCA of "3minutes after SI"	IVCCA of " after applying MUD"
0.69(0.44-1.15) cm²	1.33 (0.49-1.91) cm²

Discussion

We demonstrate that MUD was not effective in all pregnant women, but in the patients whose IVCCAs were compressed more than 20% after SI, MUD was relieved compression on the IVC. This result partially supported past studies.

Limitations:

1. The number of excluded patients
2. The technique of MUD

Conclusion

We measured IVCCA in parturient women during anesthetic management for elective CS by ultrasonography. Although MUD was considered to be effective in patients whose IVCCA decreased after SI, IVCCA was not increased in general by MUD.

Reference

1.Kundra P, Khanna S, Habeebullah S, Ravishanker M. Manual displacement of the uterus during Caesarean section. *Anaesthesia* 2007; 62: 460-465.
2.Higuchi H, Takagi S, Zhang K, Furui I, Ozaki M. Effect of lateral tilt angle on the volume of the abdominal aorta and inferior vena cava in pregnant and nonpregnant women determined by magnetic resonance imaging. *Anesthesiology* 2015; 122: 286-93.

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