

# **Respiratory Variation of Carotid Doppler Peak Velocity in Liposuction Fluid Management**

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## Study Description

The research will involve 50 female patients who have undergone liposuction and will be divided into two groups.

**Group Intraoperative fluid ratio:** Fluid administration will be determined by the intraoperative fluid ratio. This ratio is calculated by dividing the sum of subcutaneous infiltration and intravenous fluid by the total aspirate volume. Depending on the aspiration volume, it will be maintained at 1-1.4.

**Group Carotid Artery Peak Velocity Variation:** Participants will be given a fluid maintenance rate of 1.5 ml/kg/h. To determine fluid responsiveness, the carotid artery peak velocity variation ( $\Delta V_{Peak-CA}$ ) will be measured before, during, and after the procedure. If the  $\Delta V_{Peak-CA}$  goes above 15%, the patient will receive a fluid bolus of lactated ringer solution at a rate of 4-6 ml/kg over 10-15 minutes, and the team will re-measure fluid responsiveness 10 minutes after each  $\Delta V_{Peak-CA}$ .

During the examination, a single cardiothoracic anesthesiologist will use a 13-6 MHz linear probe (Fujifilm Sonosite M-Turbo) to measure the peak velocity of the carotid artery on the left side. The sample volume will be positioned at the center of the lumen, 2 cm from the bulb, and a pulsed wave Doppler examination will be conducted.

To measure the  $\Delta V_{Peak-CA}$ , the investigators will calculate the maximum and minimum values during one respiratory cycle. This will be done by using the formula:  $100 \times (\text{maximum peak velocity} - \text{minimum peak velocity}) / [(\text{maximum peak velocity} + \text{minimum peak velocity})/2]$ .

## Surgical technique

The superwet tumescence technique will be the only method utilized for infiltration during the procedure. All participants will undergo power-assisted liposuction, and a single surgeon will operate. The wetting solution will contain 1000cc of normal saline and 2mg of epinephrine in a 1:500,000 ratio. The total infiltration volume will depend on the participant's surgery characteristics. The total amount of aspiration will depend on the participant and surgery plan and can vary between 2500 to 5000 ml

During the surgical procedure, the investigators will monitor vital signs such as blood pressure, heart rate, temperature, oxygen levels, and urine output. Additionally, the investigators will track the amount of fluids given and removed and the volume of blood aspirated.

Following surgery, participants will be hospitalized for 24 hours. During this time, the investigators will closely monitor the plethysmography variability index (PVi) in both groups.

If the PVi exceeds 15%, patients will receive a ringer lactate fluid bolus of 4-6 ml/kg over 10-15 minutes. Additionally, the investigators will keep track of their urine output, total fluid balance, and vital signs

## **Arms and interventions**

Experimental: Group Carotid Artery Peak Velocity Variation

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Active Comparator: Group Intraoperative fluid ratio

The intraoperative fluid ratio will determine fluid administration. This ratio is calculated by dividing the sum of subcutaneous infiltration and intravenous fluid by the total aspirate volume. Depending on the aspiration volume, it will be maintained at 1-1.4.

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## **Outcome Measures**

Primary Outcome

1.- Mean Postoperative PVi

Following surgery, participants will be hospitalized for 24 hours. Throughout this period, we will keep a close eye on the Plethysmography Variability Index in both groups. The PVi is a dynamic index that measures the relative variability of the plethysmography waveform detected noninvasively from a pulse oximetry sensor, ranging from 0 to 100. By automatically calculating the dynamic changes that occur during the respiratory cycle, it uses the detected amplitudes. A higher variability in the plethysmography waveform has been linked to preload dependence and fluid responders. If the PVi exceeds 15%, the patient will receive a fluid bolus of lactated ringer solution at a rate of 4-6 ml/kg over 10-15 minutes.

## 2.- Postoperative intravenous fluid balance

Following surgery, participants will be hospitalized for 24 hours. During the postoperative period, the investigators will keep track and document the exact volume of fluid administered in milliliters.

## Secondary Outcome Measures

### 3.- The intraoperative total volume of urine in the participant's catheter bag

During the intraoperative period, the investigators will measure and record the total volume of urine accumulated in the participant's catheter bag over the surgery period and will report urine output measured in milliliters per kilogram per hour.

### 4.- The postoperative total volume of urine in the participant's catheter bag

During the postoperative period, the investigators will measure and record the total volume of urine accumulated in the participant's catheter bag over a 24-hour period and will report urine output measured in milliliters per kilogram per hour.

### 5.- Mean arterial blood pressure during hospitalization

Following surgery, participants will be hospitalized for 24 hours. During this time, the investigators will monitor mean arterial pressure.

### 6.- The intraoperative intravenous fluid balance

Throughout the surgical procedure, the investigators will meticulously monitor and record the precise amount of fluid administered in milliliters.

## **Eligibility**

### Inclusion Criteria

- Female patients between 21 and 60 years old
- Liposuction with or without abdominoplasty
- American Society of Anesthesiologists I & II.

### Exclusion Criteria

- History of previous liposuction surgery
- American Society of Anesthesiologist III

- Coagulation disorders
- Cardiopulmonary disorders

## Statistical analysis

We will express continuous variables as means with standard deviation and percentages for categorical variables. To test the data statistically, we will use Student's t-test or Chi-square test depending on the appropriateness. P-values less than 0.05 will be considered statistically significant. The analyses and calculations will be performed using SPSS Statistics 21.0 (IBM, NY, USA).

## References

Song Y, Kwak YL, Song JW, Kim YJ, Shim JK. Respirophasic carotid artery peak velocity variation as a predictor of fluid responsiveness in mechanically ventilated patients with coronary artery disease. *Br J Anaesth*. 2014 Jul;113(1):61-6. doi: 10.1093/bja/aeu057. Epub 2014 Apr 9. PubMed ID: 24722322

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Wang G, Cao WG, Zhao TL. Fluid management in extensive liposuction: A retrospective review of 83 consecutive patients. *Medicine (Baltimore)*. 2018 Oct;97(41):e12655. doi: 10.1097/MD.00000000000012655. Erratum In: *Medicine (Baltimore)*. 2018 Nov;97(44):e13212. PubMed ID: 30313055

# **Informed Consent Form**

## **Title of Research:**

Respiratory Variation of Carotid Doppler Peak Velocity in Liposuction Fluid Management

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## **1.- Introduction and Purpose of the Study**

The aim of this research is to compare two techniques that anesthesiologists can utilize to calculate the correct amount of intravenous fluid required for a liposuction operation.

During the investigation, the vital signs of the participants will be closely monitored including blood pressure, heart rate, temperature, oxygen levels, and urine output. The investigators will also keep track of the amount of fluids administered and removed, as well as the volume of blood drawn.

## **2.- Subject participation**

The investigators anticipate enrolling 50 participants in this study. To be eligible, participants must be aged between 21 and 60 years old and have scheduled liposuction with or without abdominoplasty.

## **3.- Potential risks and discomforts**

You can be confident that the surgery will not entail any extra hazards aside from those typically linked to liposuction. It will be executed in the customary manner, with all the

precautions. Throughout the procedure and during your hospital stay, the anesthesiologist will provide care for you, just as they do for all patients.

#### **4.- Potential Benefits**

This study will assist us in identifying the most effective approach to determine the required amount of fluids for our patients during liposuction.

#### **5.- Privacy and Confidentiality**

We will keep all the personal information you provide us, such as your name, address, and telephone number, confidential. This includes your clinical data and hospital test results. Your privacy is our top priority, and we will not disclose any information that could reveal your identity when we publish or present the study's results at conferences. For record-keeping purposes, we will assign you a number instead of using your name to protect your identity.

Name and signature of the subject

Name and signature of the person obtaining the consent

Witness 1

Witness 2