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Impact of Sitting or Semi-Setting Position of Patients During Breast Surgery on Hemodynamic Indexes

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ABSTRACT

Background: Keeping the patient in a sitting or semi-sitting position for time-consuming oncoplastic breast surgery is a major challenge for anesthesiologists due to several considerations. This cohort study was conducted on two groups of patients undergoing breast surgery.

Methods: Study participants were categorized into two groups: one group was composed of normotensive women (group A) and the other group comprised women with controlled hypertension (group B). After the induction of anesthesia in the supine position, the position was changed to sitting and the surgery was done in the sitting position. Hemodynamic monitoring included ECG, heart rate, non-invasive blood pressure (NIBP), invasive blood pressure (IBP), cardiac output (CO), arterial O2 saturation (SPO2), end-tidal CO2 (EtCO2), and bispectral index (BIS). The amount of administrated fluid and vasopressor was recorded for each patient. Any episode of hemodynamic instability was recorded, too.

Results: Hemodynamic variation occurred in both groups, but the changes were more significant in group B and the amount of fluid and vasopressor administration was more prominent in group B. Changing the position caused no significant variation in BIS, SPO2, and EtCO2 in the two groups.

Conclusions: The sitting position can be safe for time-consuming oncoplastic breast surgery using adequate hemodynamic monitoring. Hemodynamic changes are more significant in patients with controlled hypertension, and more medical interference is needed for these patients.

Introduction

Breast surgery with conservative strategies is a preferable method for most cases with breast cancer.[1] However, in the postoperative period, some women are not satisfied with the result because of aesthetic reasons.[2, 3] The main cause is the presence of size changes in the breast and asymmetry.[1-3] In recent years, surgeons in this field pay much attention to this matter, and try to provide a better breast shape and symmetry.[2-9] Today, oncoplastic breast surgeons employ plastic surgery principles to obtain aesthetically acceptable results.[3-6] One of these principles is keeping the patient in a breast hanging position; either a sitting or a semi-sitting position, to save and reconstruct the physiologic shape of the breast.[8-17] For this time-consuming type of surgery, there are variable methods of anesthesia, and general anesthesia is one of the preferable methods.[18, 19] Keeping the patient in the sitting or semi-sitting position is an important challenge for anesthesiologists because of several considerations, [20, 21] including limited access to the airway due to surgical draping; hypotension during positioning due to blunted sympathetic reflex in the anesthetized

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patient;[20-22] cerebral blood insufficiency, especially when tht mean arterial blood pressure is less than 70mmHg; etc.[23, 24] This is a study on hemodynamic changes of patients with breast cancer who underwent oncoplastic breast surgery in the sitting position.

Methods

This prospective cohort study was conducted in the breast surgery operating room of Imam Khomeini General Hospital for one year from January 2015 to January 2016. In this period, all patients who were scheduled for oncoplastic breast surgery in the sitting position and met the criteria were enrolled in the study after obtaining the institutional ethics committee approval. There was no intervention in the study protocol for the patients other than close haemodynamic monitoring. Women aged 20-50 years in the early stages of breast cancer who were otherwise healthy or with controlled hypertension were divided into two groups: normotensive patients in group A and patients with controlled early stages of hypertension in group B. Exclusion criteria were a history of cervical spine pathology, rheumatologic diseases, cardiovascular diseases, diabetic mellitus, morbid obesity, peripheral neuropathies, collagen vascular diseases, and psychological problems. Before enrolling in the study and in preoperative visits, all the patients were informed about the study and written informed consent was obtained. The patients were admitted on the day of operation. They were weighed before operating room admission. All of them received 2mg midazolam in the pre-induction period. The patients with controlled hypertension took their medications as the protocol of anesthesia guidelines at the presence of a consultant cardiologist. Moreover, the induction of anesthesia was performed with proper doses of Na-thiopental and atracurium, and fentanyl was administered as an analgesic. The patients were intubated by ETT no 7. Anesthesia was maintained by isoflurane1-1.5%, and monitoring included noninvasive and invasive blood pressure control, ECG, spo2, ETco2, BIS, and cardiac output using the NCO system. After induction and before surgical draping, the ET tube was fixed and secured appropriately and the patient's head was also stabilized in a neutral position. The shoulder, arms, trunk, and legs were secured and fixed to the operating table by appropriately fitted straps and belts fastened around the legs and torso to minimize body movements in the sitting position. In the beginning of the operation before applying the sitting position, about 500ml normal saline was administered to all patients. The position was changed gently and gradually by close haemodynamic monitoring. The sitting beach-chair position was obtained with the trunk section raised to about 45º to 60º, the mid part of the table in 10º trendelberg position, and the lower part with knee flexion at about 20º. Routine anesthesia haemodynamic monitoring was recorded at 5-minute intervals and the mentioned advanced monitoring was recorded at 10-minute intervals. Intravenous fluid administration was performed according to haemodynamic monitoring and the amount of the administered fluid was recorded in the anesthetic chart. Whenever needed, the patients received incremental doses of 10 mg ephedrine as a vasopressor. Surgical interventions were done by a single expert breast surgeon in the sitting position, and an expert anesthesiologist guided the anesthesia team for all patients. Data were recorded in the charts by a resident in train in anesthesia who monitored the patient. The operation time in the sitting position was recorded in the patient chart, too.

The patients were followed up for 6 months through monthly telephone calls to ensure lack of any peripheral neuropathy due to the long time sitting position.

Results

During one year, 80 women who met the inclusion criteria were enrolled in the study. The study population was eighty patients with breast cancer divided equally into two groups.

The mean age of the participants was 29±5.15 years in group A and 42±7.25 years in group B ($P < 0.05$).

The mean operation time in the sitting position was about 112±27 minutes in group A and 102±17 minutes in group B ($P < 0.05$).

The mean interval between the induction of anesthesia and position change was about 25±4 minutes in group A and 32±5 minutes in group B.

The mean amount of fluid administration for hemodynamic support during the position change was 150±50ml in group A and 600± 120 ml in group B ($P < 0.05$).

According to invasive blood pressure monitoring, the mean systolic blood pressure in the supine and sitting position was 86±12 mmHg and 78±11 mmHg in group A and 106±15 mmHg and 81±11 mmHg in group B, respectively. The variation of the recorded mean systolic blood pressure in the sitting position is demonstrated in figure 1.

The mean cardiac output change in the sitting position was about 1.4±0.3 in group A and 2.3±0.4 in group B, which included patients with controlled hypertension ($P < 0.05$).

The mean heart rate in the supine and sitting position was 70±11 and 78±13 beat per minute in group A ($P < 0.05$) and 68±10 and 88±14 beat per minute in group B, respectively ($P < 0.05$) (Figure 2).

None of the patients in group A received ephedrine while 20 patients in group B received at least one dose of ephedrine.

Although there were significant differences in hemodynamic variables between the two groups, no clinically significant hemodynamic instability was recorded in two groups.

There was no significant change in BIS, SPO2, and EtCO2 in the sitting position between the two groups.

There were no signs or symptoms of peripheral neuropathy in the two groups in the six-month follow-up.

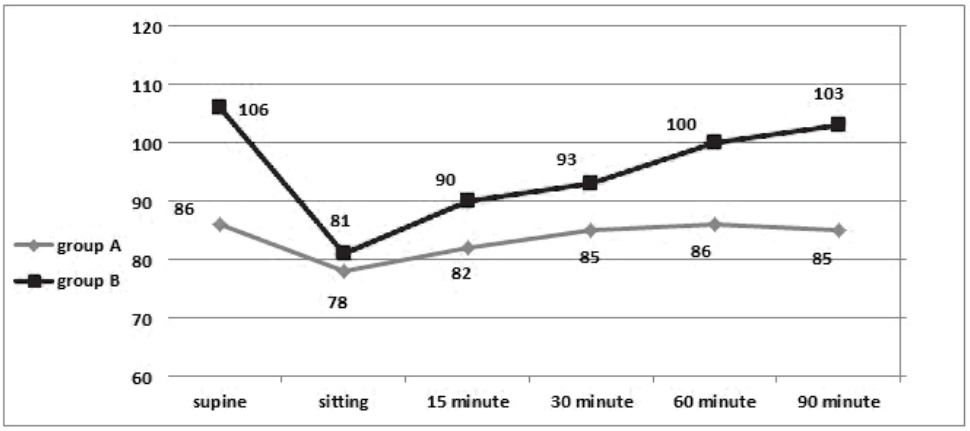

Figure 1. Systolic blood pressure variations in two groups

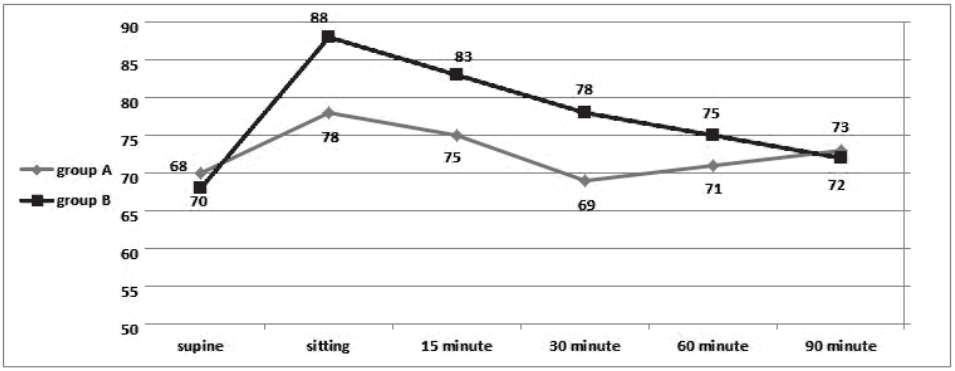

Figure 2. Heart rate variations in two groups

Discussion

Recent advances in oncoplastic breast surgery through application of a smooth surgical process have reduced breast tissue trauma, resulting in better preservation of the breast shape and improvement of the quality of life.[1-5]

In recent strategies, oncological surgery and reconstructive interventions are done in one operating session.[4-10] The major benefit of this policy is a better aesthetic outcome because reconstruction is done in the absence of the scar tissue of the previous operation.[8-12] The breast form is better evaluated and reconstructed when the breasts are hanging in the sitting position.[22] However, due to the long operation time of this surgical intervention and because of hemodynamic considerations, many centers avoid oncologic breast surgery in the sitting position.[20-22] Considering the relative risk-benefit depending on the individual cases, physical status, and surgical intervention situation is of great importance.

We studied hemodynamic variables in two groups of cohort individuals with breast cancer undergoing breast surgery in the sitting position; one group was composed of young women with no comorbidity and the other group included women with controlled hypertension. We found an acceptable safety profile in this situation with regards to proper positioning considerations.

The sitting position in an anesthetized patient may cause hypotension because sympathetic compensatory reflexes are blunted in this setting and lower extremity blood pooling may not be compensated as in non-anesthetized patients.[20, 21, 23, 24] According to figures 1 and 2 and the slope of the curves, it can be seen that the intensity of hemodynamic variation is more prominent in hypertensive patients and the compensatory mechanism is less efficient in this setting.[20-25] Gradual positioning from the supine to the sitting position and appropriate fluid or vasopressor resuscitation are important points to avoid significant or even catastrophic cardiovascular events in obtaining the sitting position.[20, 25] In the sitting position, the blood pressure to the brain is about 15 mmHg lower than the brachial artery, so it is advisable to employ invasive blood pressure monitoring and to keep the transducer at the level of ears to monitor the blood pressure of the brain.[20, 26] We did so, and this technique improved the safety profile of our patients.

We also tried to maintain the blood pressure within 25% of the baseline blood pressure as recommended by guidelines.[20, 26, 27] According to the results provided in our observational study by employing close cardiovascular monitoring, the anesthetized patient may be kept in the sitting position with fewer adverse hemodynamic events, even in long operations.

The pressure points of the body should be protected in the sitting position, especially in long operations.[27] We took this point into consideration and there was no report of peripheral neuropathy due to long time positioning in the 6-month follow up.

In conclusion, considering the better surgical outcome of oncoplastic and reconstructive breast surgery in the sitting position, we found this position safe with minimal risk. In patients with controlled hypertension, hemodynamic changes are more prominent than those with no comorbidity and the situation mandates more medical interference; by applying optimal hemodynamic monitoring and by gradually changing position, and perfect mechanical protection of the anesthetized patient`s body in this position.

Conflicts of interest

None to declare

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