

## Original Article

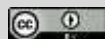
# Comparison of Mastectomy Surgery under Total Intravenous Anaesthesia (Tiva) Versus General Anaesthesia

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## ABSTRACT

*Mastectomy surgery can be done under different anaesthetic techniques. We compared general anaesthesia versus total intravenous anaesthesia for mastectomy on 53 randomly assigned patients from January 2020 to January 2021 to observe the efficacy of TIVA. Fifty three such elective surgical patients of age group (30-65 years) having American Society of Anaesthesiologist (ASA) physical status I & II were randomly assigned to one of the two groups. Group-I (n-25) patients received general anaesthesia (intravenous anaesthetic agent, inhalational anaesthetic agent, narcotic and muscle relaxant) Group-II (n-28) patients received total intravenous anaesthesia (ketamine, propofol, narcotic, NSAID). Haemodynamic parameter i.e. mean blood pressure and heart rate were recorded preoperatively and per operatively. Patient's*

*pain experience was evaluated by visual analogue scale post operatively. There were no significant ( $p > .01$ ) changes in haemodynamic parameter in both the groups. Pain evaluation by visual analogue scale was also negative. This study showed that TIVA for Mastectomy surgery is safe, cost effective and environmental friendly.*

**Keywords:** Mastectomy Surgery, Intravenous Anaesthesia, General Anaesthesia

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## INTRODUCTION

Mastectomy is the medical term for the surgical removal of one or both breasts,

partially or completely<sup>[1]</sup>. A mastectomy is usually carried out to treat breast cancer.

In some cases, women believed to be at high risk of breast cancer have the operation as a preventive measure. Alternatively, some women can choose to have a wide local excision, also known as a lumpectomy, an operation in which a small volume of breast tissue containing the tumor and a surrounding margin of healthy tissue is removed to conserve the breast. Mastectomy classifies into partial, simple, modified-radical, and radical. Other variations in terminology or technique include skin-sparing mastectomy and nipple-areolar sparing mastectomy, which are techniques that often accompany breast reconstruction. For a while, the standard treatment for breast cancer was a radical mastectomy, with total removal of the breast, lymph nodes in the underarm, and some chest muscles under the breast.

Since radical mastectomy is a body surface surgery with significant trauma and has a major impact on the respiratory system and circulatory system of patients, there is a clinical need for highly effective anesthesia modalities with good analgesic effects, such as general anaesthesia or total intravenous anesthesia. Mastectomy operation is traditionally performed under general anaesthesia in our Sher-E-Bangla Medical College Hospital. It requires costly intravenous anaesthetics, inhalational agents and muscle relaxant. Among them inhalational anaesthetics also produce environmental pollution and health hazard for the operation theatre personals. In very recent past mastectomy was performed under total intravenous anaesthesia<sup>[2]</sup>. Total intravenous anesthesia (TIVA) refers to the combination of multiple intravenous anesthetics after intravenous anesthesia induction to

maintain anesthesia by intravenous injection. Propofol is one of the most common TIVA drugs with significant advantages such as rapid onset, rapid postoperative recovery, complete recovery of various system functions, and a low incidence of adverse reactions such as nausea and vomiting. Moreover, its combined use with other anesthetics can further improve the analgesic function and enhance the anesthetic effects. At present, opioids are often combined with propofol such as fentanyl, sufentanil, and remifentanyl. The aim of this study is to compare anaesthetic outcomes of mastectomy under total intravenous anaesthesia versus general anaesthesia.

## MATERIALS AND METHODS

Fifty three female patients had been selected between the age of 30-65 years (Table I) having American Society of Anaesthesiologist (ASA) physical status I & II. A valid informed consent was taken from all the patients. They were divided into group-I and group-II randomly irrespective of their age and body weight. Group-I (n-25) patients received general anaesthesia (intravenous anaesthetic agent, inhalational anaesthetic agent, narcotic and muscle relaxant). Group-II (n-28) patients received total intravenous anaesthesia (ketamine, propofol, narcotic, NSAIDs). Both groups were treated with tablet Diazepam 0.15 mg/kg body weight orally at night (10:00 pm) before the day of operation. In operation theatre cardiovascular parameters like heart rate and mean blood pressure were recorded as control value. During the operation time heart rate and mean blood pressure were recorded 15 minutes interval for observation value. In case of group-I (n-25) Injection pethidine 1 mg/kg body

weight and inj. atropine 0.01mg/kg body weight were given as premedication agent. Intravenous anaesthetic agent propofol 2 mg/kg body weight was used as induction agent., inj. vecuroneum 1 mg/kg body

weight were used as muscle relaxants. Subsequently anaesthesia had been maintained with oxygen (O<sub>2</sub>), Nitrous oxide (N<sub>2</sub>O) and isoflurane.

**Table I: Age Distribution of Patients**

Age group (in years)	Number of cases	
	Group-I (n-25)	Group-II (n-28)
< 30	0	1
30-39	1	1
40-49	4	4
50-59	7	10
=60/ >60	13	12
Total	25	28

In case of group-II (n-28) Injection ondansetron 0.15 mg/kg body weight, inj. atropine 0.01mg/kg body weight, inj. pethidine 1 mg/kg body weight, inj. propofol 1mg/kg body weight, inj. ketamine 1.5 mg/kg body weight were given as induction agent. During operation

ketamine 1 mg/kg body weight and propofol 0.5 mg/kg body weight were given as maintenance dose by intermittent injection. oxygenation and ventilation were monitored by pulse oximeter. Results were reported as mean + SD and data were compiled in tabulated form.

## RESULT

In both the groups, the cardiovascular parameter that is heart rate and mean blood pressure (Table II and III) were not

changed significantly (P<.01 in both groups).

**Table II: Comparative changes in heart rate (beat/minute) between group-I & group-II**

Group	Control mean + SD	Per operative mean + SD	Control vs per-operative P-value
Group-I (n-25)	79 + 9.5	82 + 8.5	P<.01
Group-II (n-28)	80 + 7.7	83.2 + 6.68	P<.01

**Table III: Comparative changes in mean blood pressure (in mm of Hg) between group-I & group-II.**

Group	Control mean + SD	Per operative mean + SD	Control vs per-operative P-value
Group-I (n-25)	107 + 8.3	103.2 + 7.2	P<.01
Group-II (n-28)	103.5 + 9.01	108.3 + 7.97	P<.01

**Table IV: Comparative changes in pain sensitivity (in 0-10 numerical rating scale/ visual analogue scale [3]) between group-I & group-II.**

Group	Control mean + SD	Per operative mean + SD	Control vs per-operative P-value
Group-I (n-25)	1.0 + 0.5	1.2 + 0.4	P<.01
Group-II (n-28)	1.4 + 1.2	1.9 + 0.8	P<.01

Surgeons comfort was also evaluated by visual analogue scale (Table IV). This was also a 1-10 scale where 0 means no discomfort and 10 means maximum discomfort or surgery is not possible. The numerical rating of surgeon's discomfort was done as follows:

0 : No discomfort

1-3 : Minimal discomfort

4-6 : Moderate discomfort

7-9 : Severe discomfort

10 : Surgery not possible.

In our study, surgeons had no discomfort.(Scale 0)

## DISCUSSION

A mastectomy is a way to treat breast cancer by surgically removing a breast and sometimes nearby tissues. The term originates from the Greek word *mastos*<sup>[4]</sup> meaning "woman's breast" and the Latin term *ectomia* which signifies "excision of." Mastectomy classifies into partial, simple, modified-radical, and radical<sup>[5]</sup>. Other variations in terminology or technique include skin-sparing mastectomy and nipple-areolar sparing mastectomy, which are techniques that often accompany breast reconstruction.

The type of mastectomy depends on several things, including:

- Age
- General health
- Menopause status

- Tumor size
- Tumor stage (how far it's spread)
- Tumor grade (its aggressiveness)
- Tumor's hormone receptor status
- Lymph nodes and whether they're involved

Graham Smith's Text Book of Anesthesia describes total mastectomy surgery usually carried out under general anaesthesia. It is necessary to use a tracheal tube to secure the airway. But in our study endotracheal intubation was not done. We gave a wedge under back at shoulder level and oxygenation was maintained through face mask and ventilation was monitored by pulse oximetry. We carried out mastectomy surgery under total intravenous anaesthesia because of its lower cost and environment friendly.

G. Edward morgan, Jr. Textbook of anaesthesia describes several techniques of intravenous anaesthesia. The particular drug used is less important than the dose. We tried deep sedation with neck extension and always tried to avoid apnoea. We had used ketamine hydrochloride as intravenous anaesthetic agent. Doses varied considerably between patients and it was administered in small incremental. Regardless of the technique employed, ventilation and oxygenation was monitored continuously and equipments to provide positive pressure ventilation were always kept ready.

Various techniques of anaesthesia had been tried for mastectomy surgery. But every technique had some demerits. Ji Heui Lee, Seok Hee Kang, Yunkwang Kim, Hyun Ah Kim, Bong Seog Kim carried out a study to compare Effects of propofol-based total intravenous anaesthesia versus general (sevoflurane ) anaesthesia on recurrence and overall survival in patients after modified radical mastectomy<sup>[6]</sup>. A total of 363 (Modified Radical Mastectomy) MRMs were carried out during the period of the trial; 325 cases were suitable for analysis (173 cases of propofol group, and 152 cases of sevoflurane group). There were insignificant differences between the groups in age, weight, height, histopathologic results, surgical time, or postoperative treatment (chemotherapy, hormonal therapy, and radiotherapy). The use of opioids during the perioperative period was greater in propofol group than in sevoflurane group. Overall survival was no difference between the two groups. Propofol group showed a lower rate of cancer recurrence ( $P = 0.037$ ), with an estimated hazard ratio of 0.550 (95% CI 0.311-0.973). This retrospective study provides the possibility that propofol-based TIVA for breast cancer surgery can reduce the risk of recurrence during the initial 5 years after MRM but did not improve survival rate<sup>[7]</sup>. Another study also showed that anaesthesia with propofol sedation reduces locoregional recurrence in patients with breast cancer receiving total mastectomy compared with non-propofol anaesthesia<sup>[8]</sup>.

Very recently Lingyan Qu, Xiaoqing Wu carried out a study to evaluate the clinical value of sufentanil combined with propofol for total intravenous anaesthesia (TIVA) in radical mastectomy<sup>[9]</sup>. In their

study they performed the data of 120 patients undergoing radical mastectomy of breast cancer in their hospital from February 2020 to February 2021 were retrospectively analyzed, and they were randomly assigned to the experimental group (EXG) ( $n=60$ ) and the control group (COG) ( $n=60$ ). The anaesthesia maintenance scheme was  $0.01-0.03 \mu\text{g}/(\text{kg}\cdot\text{min})$  of sufentanyl +  $80-100 \mu\text{g}/(\text{kg}\cdot\text{min})$  of propofol in EXG and  $3 \mu\text{g}/(\text{kg}\cdot\text{h})$  of fentanyl +  $80-100 \mu\text{g}/(\text{kg}\cdot\text{min})$  of propofol in COG. The hemodynamic indices, stress indexes, postoperative pain scores, and incidence of adverse reactions were compared between EXG and COG. The heart rates (HR) and mean arterial pressure (MAP) after tracheal intubation ( $T_2$ ) and at separation of deep tissues ( $T_3$ ), tracheal extubation ( $T_4$ ), and the end of surgery ( $T_5$ ) were markedly lower in EXG than in COG ( $P<0.001$ ). The stress indexes and postoperative pain scores at 1 h ( $T_6$ ), 6 h ( $T_7$ ), and 12 h ( $T_8$ ) after surgery were lower in EXG than in COG ( $P<0.001$ ). The incidence of dizziness, headache, pruritus, and emergence agitation in EXG was lower compared with that in COG ( $P<0.05$ ). Sufentanil combined with propofol for TIVA can stabilize intra operative hemodynamic indices of patients undergoing radical mastectomy, alleviate per-operative stress response, and reduce pain perception. Jiaqiang Zhang also showed that Paravertebral block in regional anaesthesia with propofol sedation reduces locoregional recurrence in patients with breast cancer receiving breast conservative surgery compared with volatile inhalational without propofol in general anaesthesia<sup>[10]</sup>. Therefore, this anaesthesia method (TIVA)<sup>[11]</sup> is safe and merits clinical promotion.

## CONCLUSION

Our study had some limitations. Most of the patients had no idea about total intravenous anaesthesia and many surgeons didn't like it initially. They were asking for general anaesthesia. Finally we had shown them the total intravenous anaesthesia for mastectomy surgery is safe, cost effective and prevent environmental pollution. Proper patient monitoring and meticulous surgical technique will make total intravenous anaesthesia advantageous for mastectomy surgery.

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