

OBSERVATIONAL STUDY ON PERI-OPERATIVE USE OF INOTROPE INFUSION IN CORONARY ARTERY BYPASS GRAFT SURGERY

CH.RAJU ¹, CH. SHAILAJA ², V.USHASREE ³, Dr.V.SANTHOSHINI ⁴

^{1,2,3,4} MALLA REDDY INSTITUTE OF PHARMACEUTICAL SCIENCES, JNTUH,

Affiliated to Maisammaguda, Secunderabad-500100

ABSTRACT: Inotropic support is frequently initiated to improve myocardial contractility and to improve cardiac output. Advances in perioperative care are associated with improvements in the outcomes of CABG. The study was done with an attempt to look into the perioperative use of isotopes in CABG surgeries. To observe various hemodynamic parameters associated with CABG surgery. To assess the isotropic usage in subjects with co morbidity conditions, and to study various complications associated with isotopes and their management in CABG surgery. An Observational descriptive study was conducted on 150 cardiac patients who underwent CABG surgery. Data were collected from patients and evaluated by comparing with the standard guidelines like ACC/AHA and ESC. The data is collected assessed and analyzed by the CHI-SQUARE test and the data obtained was significant. A total of 150 patients are involved in the research which accounted for 46 are females followed by 104 male patients. The majority of the patients involved in the study are in between 40-70 years of age. The use of Noradrenaline (100%) is more when compared with Adrenaline (98.7%) and Dobutamine (24.7%) after surgery. complications such as tachycardias and atrial fibrillation are managed mostly by amiodarone followed by metoprolol and lidocaine. We conclude that Preoperative use of Isotropic therapy was associated with increased hemodynamic stability in most of the subjects and it also causes complications such as atrial fibrillation and tachycardia's in patients with associated co morbidities. Adrenaline Noradrenalin and Dobutamine, all are suitable for isotropic support during Emergency from cardiopulmonary bypass, produce increases in hemodynamic at constant left atria pressures, Small increases in heart rate.

Keywords: CABG surgery, Isotropic medication, tachycardias, atria fibrillation, cardiac output.

METHODOLOGY:

Approximately 100-150 samples of CABG surgery will be going to include accomplishing the study effectively. It is an observational descriptive study, which will include the patients enrolled in surgery wards of the Cardiology department. The study will be emphasizing on exposure of patients to isotropic therapy, its duration, pharmaceutical intervention, and various complications associated with isotopes and their management. The the study will focus to look into the preoperative use of inotropes in Malla Reddy Narayana Multispecialty Hospital.

Proposed methodology for CABG cases

Study Design: Observational descriptive Study.

Study Period: January 2021 to June 2021.

Sample Size: 150 subjects were enrolled in the study.

Study Site: the study is conducted in the department of ICU and CARDIO WING in "MALLA REDDY NARAYANA MULTI-SPECIALITY HOSPITAL, Suraram'X' road, Jeedimetla, Hyderabad.

Inclusion criteria:

- **Age:** Patients above 18 years of age,
- **Gender:** Subject of either gender,
- Patient with HTN, DM, CKD,
- Patient with CABG (1-4) and quintuplegrafts.

Exclusion criteria:

- The patient below 18 years of age,

- Pregnant women and lactating women.

Sampling technique: Stratified random sampling method was conducted to select a more representative sample. There are seven therapeutic indications of major surgery during the study period, to calculate the sample allocated to each stratum proportionate allocation was used. Then a simple random sampling was done depending on the type of allocation

Study variables

- Age and Gender of each patient
- No. of grafts used in surgery.
- Type of surgery (on pump / off-pump) Hemodynamic parameters (HR, BP, MAP, EF).
- Usage of adrenaline, noradrenaline and dobutamine in preoperative CABG.
- Complications and their management.

Data collection procedure: Relevant information about each patient like demographic details, Angiographic profiles, Surgical parameters, Preoperative complications & related variables, Peri-operative data (use of isotopes in intra and postoperative CABG patients including other medication used), other co morbid conditions, duration of hospitalization stay and condition of discharge were recorded using well-structured data collection format through reviewing medical records of patients. Other supplementary information was obtained from the register. Appropriateness of isotopes use was checked.

- Formulating a data collection form.
- Identification of isotopes prescribed in CABG.
- The study was conducted by prospective study design
- The data collected are entered into the data collection form
- After the collection of data, it is evaluated and compared with the standard guidelines
- Interaction with the health care professionals
- Assessment of outcomes
- The results are reported and submitted

EC approval: The study was approved by the Institutional Ethics (IEC) of Malla Reddy Medical College for Women.

Statistical analysis:

- To compare the observed values in the data to the expected values CHI SQUARE TEST is used.
- Significance when using CHI SQUARE was assumed if $p < 0.05$.

EXPECTED OUTCOMES:

- Monitoring of various hemodynamic parameters associated with CABG surgery by these of isotopes.
- Observation of various complications associated with isotopes in post-CABG surgery and their management.
- Post-surgical evaluation of the patient's condition.

RESULTS

AGE-WISE DISTRIBUTION:-

A total of 150 cases that underwent CABG surgery at ICU and Cardio wing of tertiary care hospital were examined during the study period based on inclusion and exclusion criteria. Age-wise distribution of the causes is given in the table below with the class interval of 10 years and their frequencies.

| Age | Frequency | Percentage |
|-------|-----------|------------|
| 40-50 | 30 | 20% |
| 50-60 | 61 | 40.6% |
| 60-70 | 46 | 30.6% |
| 70-80 | 13 | 8.6% |

Table .1 Age-wise distribution of subjects

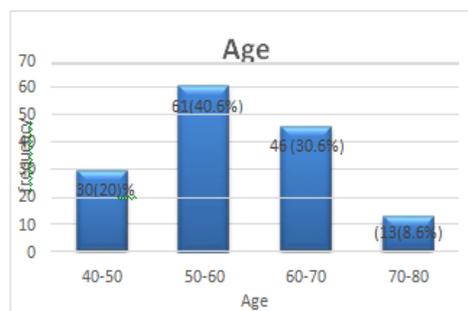


Figure.1 Graphical representation of the age-wise distribution

GENDER WISE DISTRIBUTION: - In our observational study a total of 150 cases were collected in 4 months of which 69.3% were males and 30.6% are females

| Gender | Frequency | Percentage |
|--------|-----------|------------|
| F | 46 | 30.6% |
| M | 104 | 69.3% |

Table .2 Gender wise distributions of subjects

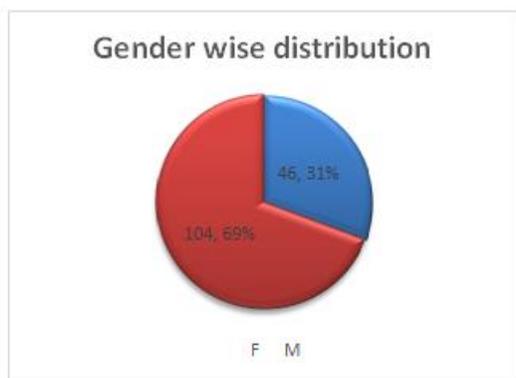


Figure.2 Graphical representation of the gender-wise distribution

Type of surgery V/s No of grafts:

In 150 CABG cases, there were 70 on-pump CABG surgery cases and 80 Off-pump CABG cases were collected. In on-pump CABG surgery, the subjects with one graft are (4), with two grafts (29), with three grafts (23), with 4 grafts (14). In Off-pump CABG surgery, the subjects with one graft are (11), with two grafts are (23), with three grafts are (32), with four grafts are (12), and with 5 grafts are (2).

Table 3. Type of surgery v/s No of grafts

| surgery/grafts | 1 | 2 | 3 | 4 | 5 |
|----------------|----|----|----|----|---|
| On Pump | 4 | 29 | 23 | 14 | 0 |
| Off Pump | 11 | 23 | 32 | 12 | 2 |

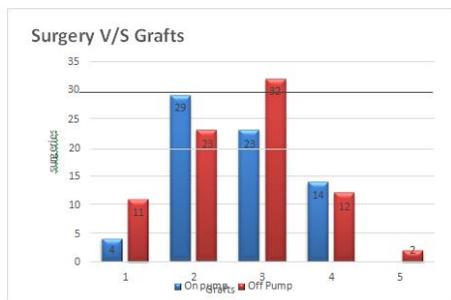


Figure 3. Pictorial representation of the type of surgery v/s no of grafts

INOTROPES USED IN PERI-OPERATIVE CABG SURGERY:

In 150 cases mostly 3 isotopes were used. The percentage of adrenaline used in pre- operative surgery is 9.3%, in intraoperative is 98.7% and in post-operative is 98.7%. The percentage of noradrenaline used in preoperative surgery is 6.0%, in intraoperative 100%, and post-operative 100%. The percentage of dobutamine used in intraoperative is 3.3%, in intraoperative is 12.7% and in postoperative is 24.7%. The pictorial representation of usage of inotropes in preoperative CABG surgery is shown in Figure 4.0.

Table.4 Isotropes used in preoperative CABG surgery.

| Inotropes | Pre-operative | % | Intraoperative | % | Post-operative | % |
|---------------|---------------|------|----------------|--------|----------------|--------|
| Adrenaline | 14 | 9.3% | 148 | 98.7% | 148 | 98.7% |
| Noradrenaline | 9 | 6.0% | 150 | 100.0% | 150 | 100.0% |
| Dobutamine | 5 | 3.3% | 19 | 12.7% | 37 | 24.7% |

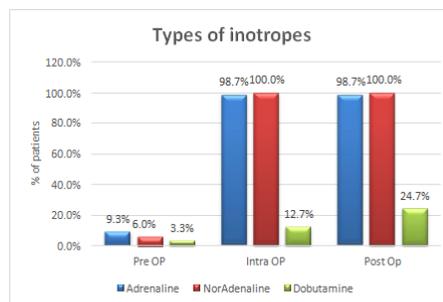


Figure 4.0 pictorial representation of isotopes used in CABG surgery.

Complications vs Management: -

Most of the patients after CABG surgery experience complications such as tachycardias and atrial fibrillation. In 150 patients enrolled, 22 subjects experienced tachycardia's and were treated within amiodarone, tab metoprolol, and inj lidocaine. 11 subjects experienced atrial fibrillation and treated with inj amiodarone and inj lidocaine.

| Complications | Inj.Amiodarone | Tab.Metoprolol | Inj. lidocaine |
|---------------------|----------------|----------------|----------------|
| Atrial fibrillation | 18 | 0 | 4 |
| Tachycardia | 3 | 8 | 0 |

Table 5. Distribution of complications v/s management of tachycardias and atrial fibrillation.



Figure 5. Pictorial representation of complications v/s management.

DISTRIBUTION OF COMORBIDITIES IN SUBJECTS WHO UNDERWENT CABG:

| Comorbidities | HTN,CKD,DM | HTN, CKD | HTN | HTN, HYPOTHYROIDISM | DM,HTN |
|---------------|------------|----------|---------|---------------------|---------|
| Frequency | 62 (42%) | 3 (2%) | 42(28%) | 8(5%) | 35(23%) |

Table 6. Distribution of comorbidities in subjects underwent CABG.

Table 6 shows that subjects with comorbidities underwent CABG surgeries. The frequency of HTN is more when compared to other comorbidity conditions.

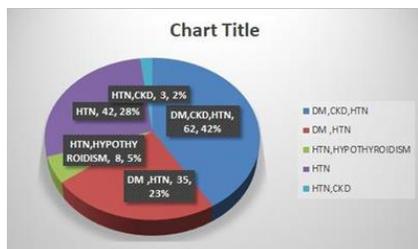


Figure.6 Pictorial representation of subjects with comorbidities.

HEMODYNAMIC STABILIZATION WITH THE USE OF INOTROPES:

In 150 patients enrolled out of which 105 patients became hemodynamically stable after 3 days, 30 became stable after 5 days and 15 became stable within 7 days.

| Days to become hemodynamically stable | Within 3 days | Within 5 days | Within 7 days |
|---------------------------------------|---------------|---------------|---------------|
| Frequency | 105 | 30 | 15 |

Table.7 Distribution of attaining hemodynamic stability with the use of isotopes.

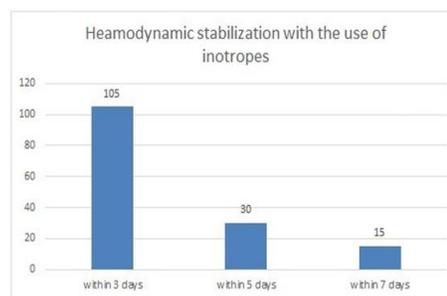


Figure .7 Graphical representation of hemodynamical stability with the use of isotopes.

CHI - SQUARE TEST RESULTS:

We have done the CHI SQUARE test to test the level of significance between the variables as shown in the table below. The data is tested and the level of significance is (< 0.05%. it shows that the data is significant.

| Columns 1 | Columns 2 | P- Values |
|------------------------------|----------------------------|-----------|
| Adrenaline during surgery | Adrenaline post-surgery | 0.0300 |
| Noradrenaline during surgery | Noradrenaline post-surgery | 0.0005 |
| Dobutamine during surgery | Dobutamine post-surgery | 0.0005 |
| Complications | Management | 0.0005 |
| BP | MAP | 0.0005 |
| HR | BP | 0.0200 |

DISCUSSION:

- We initiated the project after the approval of the institutional ethical committee; we worked on an Observational descriptive study of preoperative use of isotopes in CABG surgery within a period of six months from January 2021 to June 2021.

- Later we formulated a data collection form, we collected 150 CABG case studies in which 80 were off-pump and 70 were on-pump CABG surgeries. We observed that mostly three isotopes Adrenaline, Noradrenaline, and Dobutamine were prescribed in preoperative CABG surgery and these three drugs are given less in the preoperative period. Adrenaline and noradrenalin were given more in intra and postoperative periods. Dobutamine is given less compared to adrenaline and noradrenalin.
- Most of the subjects with fewer co morbidity conditions stabilized faster than the subjects with higher co morbidity conditions.
- Isotopes can be given in any co morbidity conditions and in some cases, they were given according to the severity of co morbidities.
- Complications such as atria fibrillation and tachycardias are seen in subjects with post- CABG surgery. Tachycardias have mostly occurred when compared to atrial fibrillation. These complications are managed by giving an infusion of Amiodarone and lidocaine.
- We worked on statistics and tested the data by using CHI-SQUARE TEST, our results show that the level of significance is $>0.05\%$. Hence the data we used is significant.

CONCLUSION

- We concluded that Preoperative use of Isotropic therapy was associated with increased hemodynamic stability in most of the subjects and it also causes complications such as atria fibrillation and tachycardia's in patients with associated co morbidities.
- These complications are caused due to alteration in the Effective refractory period and action potential depolarization which causes ectopic firing that leads to alteration in calcium levels and automaticity
- Adrenaline causes less tachycardia than Noradrenalin and Dobutamine at equivalent isotropic doses. When Adrenaline increases the HR within the physiologic range, we conclude that Adrenaline is the superior chronoscopic isotope compared to Dobutamine for preoperative management of CABG surgery.
- Adrenaline Noradrenalin and Dobutamine, all are suitable

for isotropic support during Emergency from cardiopulmonary bypass, produce increases in hemodynamic at constant left atrial pressures, Small increases in heart rate.

- We observed that as the no of grafts increases the use of a combination of isotopes increases. Most of the subjects with fewer co morbidity conditions stabilized hemodynamic ally faster than the subjects with higher co morbidity conditions by the use of isotopes.

REFERENCE

- [1] Gavaghan M. Cardiac anatomy and physiology: a review. AORN journal. 1998 Apr 1;67(4):800-22.
- [2] Gavaghan M. Cardiac anatomy and physiology: a review. AORN journal. 1998 Apr 1;67(4):800-22.
- [3] Hertzner NR, Beven EG, Young JR, O'Hara PJ, Ruschhaupt 3rd WF, Graor RA, Dewolfe VG, Maljovec LC. Coronary artery disease in peripheral vascular patients. A classification of 1000 coronary angiograms and results of surgical management. Annals of surgery. 1984 Feb;199(2):223.
- [4] Hanson MA, Fareed MT, Argenio SL, Agunwamba AO, Hanson TR. Coronary artery disease. Primary care. 2013 Mar 1;40(1):1-6.
- [5] Williams A. Economics of coronary artery bypass grafting. Br Med J (Clin Res Ed). 1985 Aug 3;291(6491):326-9.
- [6] Calafiore AM, Angelini GD, Bergsland J, Salerno TA. Minimally invasive coronary artery bypass grafting. The Annals of Thoracic Surgery. 1996 Nov 1;62(5):1545-8.
- [7] Lamy A, Devereaux PJ, Prabhakaran D, Taggart DP, Hu S, Paolasso E, Straka Z, Piegas LS, Akar AR, Jain AR, Noiseux N. Off-pump or on-pump coronary-artery bypass grafting at 30 days. New England Journal of Medicine. 2012 Apr 19;366(16):1489-97.
- [8] Diegeler A, Börgermann J, Kappert U, Breuer M, Böning A, Ursulescu A, Rastan A, Holzhey D, Treede H, Rieß FC, Veeckmann P. Off-pump versus on-pump coronary-artery bypass grafting in elderly patients. New England journal of medicine. 2013 Mar 28;368(13):1189-98.
- [9] Shroyer AL, Grover FL, Hattler B, Collins JF, McDonald GO, Kozora E, Lucke JC, Baltz JH, Novitzky D. On-

- pump versus off-pump coronary-artery bypass surgery. *New England Journal of Medicine*. 2009 Nov 5;361(19):1827-37.
- [10] Souza DS, Johansson B, Bojö L, Karlsson R, Geijer H, Filbey D, Bodin L, Arbeus M, Dashwood MR. Harvesting the saphenous vein with surrounding tissue for CABG provides long-term graft patency comparable to the left internal thoracic artery: results of a randomized longitudinal trial. *The Journal of thoracic and cardiovascular surgery*. 2006 Aug 1;132(2):373-8.
- [11] Bonatti J, Wehman B, de Biasi AR, Jeudy J, Griffith B, Lehr EJ. Endoscopic quadruple coronary artery bypass grafting is feasible using robotic technology. *The Annals of thoracic surgery*. 2012 May 1;93(5):e111-2.
- [12] Goldstein DS. Catecholamines 101. *Clin Auton Res*. 2010 Dec;20(6):331-52. doi: 10.1007/s10286-010-0065-7. Epub 2010 Jul 11. PMID: 20623313; PMCID: PMC3046107.
- [13] hung SCS, Leung JWC, Steele RJC, et al: Endoscopic injection of adrenaline for actively bleeding ulcers: a randomized trial. *BMJ* 1988; 296:1631-1633.
- [14] Campbell RL, Li JT, Nicklas RA, et al: Emergency department diagnosis and treatment of anaphylaxis: a practice parameter. *Ann Allergy Asthma Immunol* 2014; 113(6):599-608. [15]. Peberdy MA, Callaway CW, Neumar RW, et al: 2010 American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care science. Part 9: post-cardiac arrest care. *Circulation* 2010; 122(18 Suppl 3): S768-S786.
- [15] Product Information: LEVOPHED(R) intravenous injection, norepinephrine bitartrate intravenous injection. Hospira Inc (per FDA), Lake Forest, IL, 2020.