



ORIGINAL ARTICLE

Post operative outcomes of del-nido cardioplegia in adult cardiac surgery.

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Article Citation: Khan A, Shah A, Khan AH. Post operative outcomes of del-nido cardioplegia in adult cardiac surgery. Professional Med J 2024; 31(11):1573-1577. <https://doi.org/10.29309/TPMJ/2024.31.11.8337>

ABSTRACT... Objective: To evaluate the post-operative results for defibrillator use, length of hospital stay, and inotropic support in adult patients who underwent cardiac surgery in Del-Nido Cardioplegia. Cardiac enzymes and potassium levels are measured before and after surgery in adult cardiac surgery patients in order to look for arrhythmias. **Study Design:** Observational Cross-sectional study. **Setting:** Afridi Medical Complex, Peshawar. **Period:** October 2022 to March 2023. **Methods:** 50 Patients were selected randomly by using Non-Probability Convenient sampling method technique. **Results:** In our study the mean age of patients was (50.92 ±9.429). Cardiac enzyme level post-op after 24 hours (67.3540±23.21292). Potassium level post-op group (4.5590± .65033), and length of hospital stay (8.58±1.486). Post operative outcomes shows significant association p value <0.05. **Conclusion:** This study concluded that Del Nido Cardioplegia is an intended and brief arrest of heart function, especially in cardiopulmonary Bypass surgery. Better myocardial protection is provided by Del-Nido Cardioplegia and it is very safe and effective process. It Provide good post operative outcome as are available in different literature reviews preceding our study.

Key words: Coronary Artery Bypass Grafting, Coronary Artery Disease, Del-Nido Cardioplegia, Myocardial Protection.

INTRODUCTION

Coronary artery disease is the primary cause of mortality in the over-35 population of the world.¹ Around 1000 operations are performed every day in the US alone out of the approximately 800,000 coronary artery bypass graft (CABG) surgeries or valve treatments that are documented each year globally. The normal in-hospital/30-day mortality rates for CABG are 1%, for valve surgery they are 5–6%, and for CABG and valve surgery together they are 7%.^{2,3}

Intracellular Ca²⁺ excess, oxidative stress and ischemia-reperfusion damage impair myocardial preservation and function during this surgery and might all result in post-operative myocardial dysfunction. Warm blood Cardioplegia, Buck berg solution, and whole blood Cardioplegia (WB) are the three forms of Cardioplegia that are now accessible.⁴ Considering that Dr. Melrose first disclosed an elective cardiac arrest in 1955, One of the key protective strategies, Cardioplegia,

has taken several different forms over time.⁵ The optimal Cardioplegia technique results in rapid diastolic arrest and a decrease in myocardial metabolic demand, resulting in a quiescent heart that is susceptible to surgical intervention.

After reperfusion, myocardial damage should be minimized by swiftly reestablishing non-ischemic sinus rhythm. The majority of researchers at the University of Pittsburgh developed a novel Pittsburgh for myocardial protection in the early 1990s.⁶ The original composition has undergone revisions, and it is now referred to as Del Nido Cardioplegia in both the literature and clinical practice.⁷ Del Nido According to reports⁶, Cardioplegia has been connected to fast aortic cross clamp and bypass times. In a 2016 research, patients with ischemic heart disease who required single or multiple vessel bypass surgery as well as patients with valvular heart disease who required valve replacement were included. At p values greater than 0.05, the results demonstrated that

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Article received on: 03/08/2024
Accepted for publication: 05/10/2024

the durations of cardiopulmonary bypass, cross-clamp, and hospital stay were all equal.

Several Cardioplegia methods are utilized to accomplish safe cardiac surgery with few problems and a quick recovery. Compared to the historically common Howard's Cardioplegia solution, which lengthens Cardioplegia and has a greater complication risk, Del Nido Cardioplegia is now regarded to be a safer method with superior results. While the majority of surgeons recommended employing the Del Nido Cardioplegia, some surgeons chose to do heart surgery on Howard while he was paralyzed. Cardioplegia is made up of different ingredients in different hospitals; for instance, at our institution, Del Nido Cardioplegia is made up of potassium chloride (kcl) 26 mEq, sodium bicarbonate (Na_2HCO_3) 13 mEq, magnesium (Mg), 2 g, lignocaine 6.5 ml/130 mg/dL, and mannitol 16 ml.

In order to compare cardiac enzymes and potassium levels in adult patients undergoing cardiac surgery pre- and post-operatively, identify arrhythmias in pre- and post-adult cardiac surgery, and assess post-operative outcomes for inotropic support, defibrillator need, and length of hospital stay, our study's objectives were established.

METHODS

This observational study used structured Performa and was based on earlier research that included both open-ended and closed ended questions. To evaluate several aspects of the cardiac surgery called Del Nido Cardioplegia at the Afridi Medical Complex. Adult heart surgery patients participated in a study (CABG, single valve replacement or multiple valve replacement surgery and Elective surgery).

The hospital ethics committee provided its ethical approval (001-IRBC AMC). Patients were asked for formal written informed consent. The study was carried out from October 2022 to March 2023 over a six-month period. A total of 50 patients were included in the trial, which had sample size of 50. Non-probability sequential sampling was used to collect the sample.

CABG, a single or multiple valve replacement, and being between the ages of 30 and 70 Elective procedures were covered. The research excluded patients with cardiogenic shock, reoperation, emergency surgery, left ventricular dysfunction (EF 30%), renal dysfunction (preoperative serum creatinine level > 1.5 mg/dL), and left ventricular dysfunction (EF 30%). After coding data from patients filled-out Performa's was input and analyzed using SPSS version 25.

RESULTS

A detail of demographic characteristics of patients has been given in Table-I reveals that the mean age of del-Nido Cardioplegia patients was (50.92 ± 9.429), and that male and female gender distributions were 42(84%) and 8(16%) respectively. Additionally, this table displays the prevalence and proportion of del-Nido patients who have ever smoked before (18%).

Table-II shows the mean and standard deviations of the pre- and post-DN results, which were (49.80 ± 9.455) and minutes for the aortic cross clamp (46.24 ± 16.561), Bypass time in minutes 79.86 ± 22.924 , Cardiac enzyme level (CKMB) post-op after 6 hours 58.2160 ± 24.29223 , Cardiac enzyme level (CKMB) post-op after 24 hours 67.3540 ± 23.21292 , Cardiac enzyme level (LDH) post-op after 6 hours 379.8800 ± 119.23541 , Cardiac enzyme level (LDH) post-op after 24 hours for 435.5100 ± 130.07614 , Potassium level post-op $4.5590 \pm .65033$, Duration of hospital stay 8.58 ± 1.486 .

Figure-1 illustrate the frequency and percentage of need of defibrillation after cross clamp removal 10(20.0) were need.

Figure-2 illustrate the frequency and percentage of Inotropic supports after surgery in patients. 27 (54%) patients were need of inotropic support. Minimal support for 45(90%), Moderate support 5(10%). No need of high inotropic support was observed.

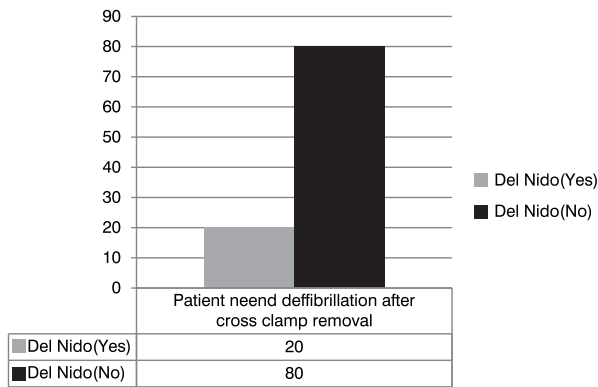


Figure-1

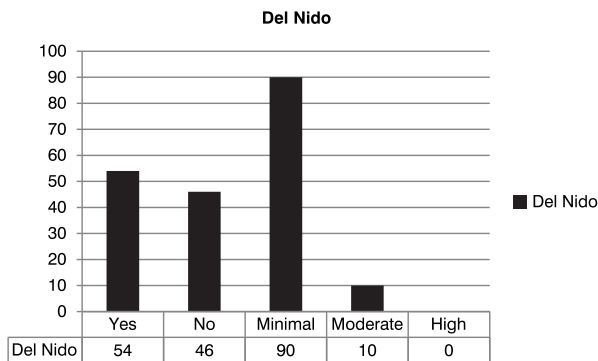


Figure-2

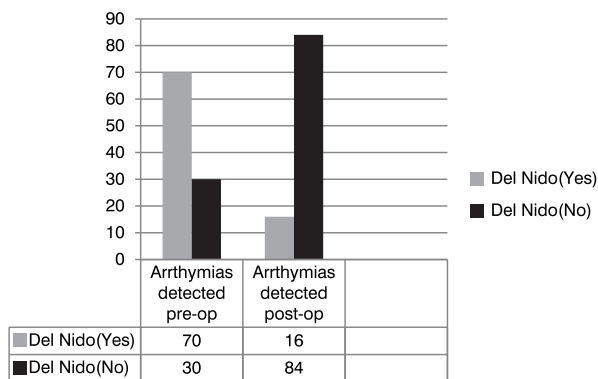


Figure-3

Characteristics	Del-Nido (n=50)	
Age (years) mean ± SD	50.92 ± 9.426	
Gender	n (%)	
Male	42 (84%)	
Female	8 (16%)	
	DN(n=50)	
History of somking	yes n (%)	no n (%)
	18 (36.0)	32 (64.0)

Table-I.

Characteristics	Del-Nido (n=50)
	Mean ± SD
Pre-op ejection fraction (%)	49.80±9.455
Aortic cross clamp time (minutes)	46.24±16.561
Bypass time (minutes)	79.86±22.924
Cardiac enzyme level (CKMB) pre-op	29.6600±19.05482
Cardiac enzyme level (CKMB) post-op after 6 hours	58.2160±24.29223
Cardiac enzyme level (CKMB) post-op after 24 hours	67.3540±23.21292
Cardiac enzyme level (LDH) pre-op	262.3600± 112.19278
Cardiac enzyme level (LDH) post-op after 6 hours	379.8800±119.23541
Cardiac enzyme level(LDH) post-op after 24 hours	435.5100± 130.07614
Potassium level pre-op	4.5720± .60442
Potassium level post-op	4.5590± .65033
Length of hospital stay(days)	8.58±1.486

Table-II

DISCUSSION

Cardioplegia, one of the principal protective strategies, has evolved in several ways since Dr. Melrose’s original report of an intentional cardiac arrest in 1955.⁵ The optimum cardioplegia solution produces rapid diastolic arrest and a decrease in myocardial metabolic demand, resulting in a quiescent heart amenable to surgical intervention. After reperfusion, a quick return to non-ischemic sinus rhythm should lessen myocardial damage.⁶ Cardioplegia solutions contain a number of ingredients. If we use it as the main means of delivering Na ions to cause cardiac arrest in extracellular area.¹⁰ In addition to providing myocardial protection during the cross-clamp period, the additional components added to the cardioplegia solution also provide protection from (IRI.12), Del Nido, and Howard’s cardioplegia, which is extensively utilized during Cardiopulmonary Bypass surgery to protect the myocardium from metabolic stress and reperfusion injury.¹¹

In a recent investigation on the many aspects of delNido cardioplegia, it was discovered that the treatment, when performed on people with acquired cardiac problems, is both efficient and

safe when modified lignocaine is used as the anaesthetic. When compared to postoperative results, ionotropes, the development of AV blocks, ventilation time, ICU stay, and the mortality rate during a one year period using standard stratifications. It was discovered that the Boston Children's Hospital had been using lignocaine-containing DelNido cardioplegia for more than 20 years; it had been created originally for newborns and paediatric patients.¹²

In the results of our study on Ionotropic supports after surgery in patients. 27 (54%) patients were need of ionotropic support. Minimal support for 45(90%), Moderate support 5(10%). No need of high ionotropic support was observed.

Data demonstrates that arrhythmias were observed in patients pre-operatively 35(70%) and Postoperatively 8(16%). This demonstrates that the prevalence of arrhythmias was Moderate.

In the results of associations, sociodemographic factors were evaluated for associations with Ionotropic support, Need for Defibrillations, and Arrhythmias found (before and postop) by using chi square. Initially, ages in years were observed for Ionotropic support, Defibrillation Requirement, and Arrhythmias found (before and post-op).

With a p value < 0.05, it was determined that there was significant correlation.

Then, depending on the type of surgery, arrhythmias and the need for defibrillations are recognised. At a p value of 0.05, the outcome was also statistically significant. A different study on the dosage of Del-Nido found that when Del-Nido cardioplegia is administered in multiple doses, the older population benefits more from it in terms of myocardial function.

We observe a significant difference between the two groups when we compare it to Del-Nido cardioplegia after a single dose and after multiple doses.

Another investigation on DelNido cardioplegia found that excellent cardiac arrest could be de-

tected with a single dose throughout the course of an hour of ischemia time. Although the phases of spontaneous rhythm in all groups were the same, the multi-dose group was more exposed to lignocaine.

According to the study's findings, both dosage groups had functional recovery of adult hearts throughout the initial phase of reperfusion, and indicators of myocardial injury were the same in each group throughout reperfusion.¹⁴ The recovery phase of that group was not measured throughout the hourlong observation period in the multidose groups, despite the fact that the single dose group had a considerably better indication of ventricular function.¹⁵

Strength of the Study

It was hospital-based research, and Performa was used in its execution. Based on the findings of this study, we advocate the use of Del-Nido Cardioplegia for postoperative outcomes since it offers benefits and we saw greater myocardial protection after using it. This might provide as a starting point for further study.

LIMITATION OF THE STUDY

Only the Del-Nido Cardioplegia was included, and the sample size was small. It only contained post-operative results; additional measurements and problems were not included. Only adult cardiac procedures were considered; paediatric surgeries were not.

CONCLUSION

In conclusion Cardioplegia is a planned and transient cessation of cardiac activity, particularly during cardiopulmonary bypass surgery. For patients of all ages who need cardiac surgery where the heart's function must be stopped, Del Nido Cardioplegia is a fundamental and crucial technique. Better myocardial protection is provided by Del-Nido Cardioplegia, which is also a highly safe and efficient procedure.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

SOURCE OF FUNDING



This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Ajab Khan	Oroof reading, Final manuscript.	
2	Adnan Shah	Write up.	
3	Attiya Hameed Khan	Data analysis.	