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Research Article

**PREVALENCE OF STROKE AMONG PATIENTS
UNDERGOING CABG (CORONARY ARTERY BYPASS
GRAFTING) AND INFLUENCE OF PREVENTIVE
STRATEGIES**¹Dr Sana Abbasi, ²Dr Saneela Mumtaz, ³Dr Maham Imtiaz¹Saidu Medical College Swat²Riphah International University³Allied Hospital Faisalabad**Article Received:** October 2019 **Accepted:** November 2019 **Published:** December 2019**Abstract:**

Objective: This research work was carried out to check the prevalence of stroke among patients who are undergoing CABG (Coronary Artery Bypass Grafting) and the influence of preventive strategies adopted in our institute.

Methodology: The information of the patients (722) who had to undergo isolated-CABG (Coronary Artery Bypass Grafting) from May 2018 to July 2019 in Allied Hospital Faisalabad retrieved and the design of this study was retrospective study. We selected all the surgeries carried out on cardio-pulmonary bypass and cold blood cardio-plegia. Averages and SDs (Standard Deviations) were in use for the summarization of the numeric data. We summarized the categorical information in percentages and frequencies.

Results: The average age of the patients was 53.830 ± 8.80 years. The average Parsonnet and Logistic Euro-Score were 4.30 ± 3.20 and 3.30 ± 0.90 correspondingly. Total 6.780% (n: 49) patients were present with carotid artery disease of significant nature. The average graft's number was 2.80 ± 0.820 . We diagnosed diabetes in 27.80% patients. We noticed the neurological complications in 1.940% (n: 14) patients who consisted twelve permanent paralyses. Further analysis of sub-group showed that sixty-seven patients whose surgeries carried out by single clamp method remained free from the complications of neurology. This is very significant finding in the clinical field but is not significant statistically due to its small sample size.

Conclusion: There can be reduction in the prevalence of complications related to neurology with the adaptation of the proper and suitable measures of prevention. Usage of the single clamp method may be the causes of such low prevalence of stroke in this research work.

KEYWORDS: Stroke, Neurology, Prevalence, Graft, Diabetes, Paralyses, Summarization, Single Clamp Method.

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INTRODUCTION:

The prevention from the complications related to neurology following CABG (Coronary Artery Bypass Grafting) is very serious challenge in surgeries related to cardiac issues. There are many factors involved for the initiation of these complications which are responsible to make the prevention of these complication very difficult. Most of the strokes normally occur during surgeries and they have large attribution to handling of aorta. The judicious usage of the anti-platelets, utilization of the arterial filters in the cardio-pulmonary bypass and rigorous intra-operative hemodynamic administration can support in reducing the complications related to neurology.

Moreover, different methods to reduce the minimize handling of aorta including OPCAB (Off Pump Coronary Artery Bypass), utilization of the anastomotic devices and building of both proximal and distal anastomoses on single clamp method are thought to decrease prevalence of stroke. Single clamp method has the potential to reduce the prevalence of stroke but there are also documentations of evidence against this very potential advantage. The main purpose of this research work is to review the results of our strategy for the reduction of neurological complications which is totally based on the evidences present in this very literature.

METHODOLOGY:

This research work is a retrospective study on the patients who had to undergo CABG (Coronary Artery Bypass Grafting) in Allied Hospital Faisalabad from May 2018 to July 2019. We retrieved the data from the database of the hospital. We found total eight hundred patients of CABG (Coronary Artery Bypass Grafting) in database. We validated the records with the findings of the files in hospital records. We found total seven hundred and twenty-two patients to have isolated-CABG (Coronary Artery Bypass Grafting) and we included them in this retrospective analysis. Remaining eighty-eight patients were present with combined methods and we excluded all these patients from this research work. Total 4 cardiac surgeons ejection fraction, level of serum creatinine and level of hemoglobin in normal ranges.

performed the surgeries. All the patients were present with detailed pre-operative information including count of full blood, tests for renal function, ECG, viral profile and ultrasound of the abdomen cavity. We defined the CVA (Cerebrovascular Accident) as 'neurological abnormality influencing the day to day functionality. We defined the TIA (Transient Ischemic Attack) as any neurological discrepancy which diminished wholesomely within twenty-four hours.

All the patients underwent proper anesthetic management. In the duration of complete method, there was proper monitoring of the ECG, oxygen saturation, central venous pressure and invasive blood pressure. All the patients had to undergo surgery with the support of CPB (Cardiopulmonary Bypass). We followed the standard procedure of CABG (Coronary Artery Bypass Grafting) for all the patients with the utilization of the single clamp technique. All the patients underwent CT scan and neurological evaluations who developed the complications. We adopted following techniques to avoid the complications;

1. We kept all the patients on Aspirin from surgery day.
2. We stopped the clopidogrel four days before the surgery for those patients who were receiving double anti-platelet treatment.
3. We gave 150.0 mg aspirin within six hours of surgery to all the patients.
4. We did not reverse the heparin among patients who were present with disease of coronary endarterectomy.
5. We used the arterial filters for all the patients in bypass circuits.
6. We kept the average blood pressure strictly greater than 60.0 mm Hg while on bypass.

RESULTS:

The numeric variables of samples of this research work before surgery are present in Table-1. The average age of the patients was 53.830 years. We found the average

Table-I: Preoperative Patient Characteristics: Continuous Variables

Variable	No	Mean	Median	Stand Dev
Age	722.0	53.830	54.000	8.800
BMI	722.0	28.790	28.000	8.470
LVIDD	658.0	49.380	49.000	18.450
LVIDS	644.0	32.640	32.000	6.430
EF	711.0	52.700	60.000	10.170
Right Carotid -Stenosis	49.0	14.900	10.000	6.810
Left Carotid Stenosis	49.0	25.270	20.000	11.190
Creatinine	722.0	0.950	0.900	0.170
Hemoglobin Risk Score:	722.0	13.580	13.700	1.600
Parsonnet Score	722.0	4.300	3.000	3.020
Additive Euro Score	722.0	1.020	1.000	1.060
Logistic Euro Score	722.0	1.280	1.220	0.520

The scores of Parsonnet, Additive Euro-score and Logistic Euro-score were lower than five which show that all the patients were in the group of low risk. Only forty-nine patients displayed some level of carotid disease. The summary of the categorical variables is present in Table-2.

Table-II: Preoperative Patient Characteristics: Categorical Variables

Variable		No	Percent
Gender	Male	595.0	82.300
	Female	127.0	17.570
CCS Class	Class I	69.0	9.540
	Class II	524.0	72.480
	Class III	121.0	16.740
	Class IV	7.0	0.970
	NA	2.0	0.280
NYHA Class	Class I	228.0	31.540
	Class II	402.0	55.600
	Class III	87.0	12.030
	Class IV	5.0	0.690
Hypertension	Controlled	380.0	52.560
	Uncontrolled	1.0	0.140
	None	341.0	47.160
Smoking	Still Smoking	1.0	0.140
	Ex-Smoker	24.0	3.320
	Non-Smoker	697.0	96.400
Diabetes	Nil	522.0	72.200
	Diet Controlled	1.0	0.140
	On Tablets	13.0	1.800
	On Insulin	186.0	25.730

This is clearly obvious that majority of patients appeared with stable angina of CCS Class-III. We recorded that 47.160% (n: 341) patients were present with congestive cardiac failure in the past whereas 0.550% (n: 4) patients had

cardiac failure during operation time. Majority of the patients, 74.690% (n: 540) were suffering from disease of 3-vessel coronary artery whereas 19.360% (n: 140) patients were present with the 2-vessel disease and only 4.290% (n: 31) patients were present with the disease of single vessel. It is evident that less than one percent patients were cigarette smokers at surgery time. Total 99.0% patients were present with the normal BP at admission time. The scores of risks calculated by the Parsonnet Score, Additive Euro-Score and Logistic Euro-Score are present in Table-1.

Intra-surgery and post-surgical traits of the patients are present in Table-3. The average bypass duration was 104.54 minutes and average duration of cross clamp was 65.280 minutes.

Table-III: Patient Characteristics: Operative And Post-Operative

Variables	No	Mean	Median	SD
Operative Bypass Time	722.0	104.59	98.0	42.550
Cross Clamp Time	722.0	65.28	62.0	34.830
Lowest Temperature	722.0	31.41	32.0	1.050
Proximal Anastomosis	722.0	1.92	2.0	0.870
Distal	722.0	2.8	3.0	0.820
Ventilation Time (Hrs.)	722.0	10.39	6.0	27.180
Inotropes (Hrs.)	722.0	36.78	27.0	41.970
Chest Drainage (ml)	722.0	997.57	840.0	1707.520
Max CKMB	722.0	70.38	60.0	162.770
Whole Blood (units)	692.0	2.09	2.0	1.080
FFP (units)	343.0	1.22	1.0	0.790
Platelets (Units)	0	0	0	0

We performed the analysis of sub-groups of patients having surgery by one of the authors AJ, who utilized 2 different methods. This analysis of sub-group contained a comparison between multiple and single clamp methods as present in Table-4. The patients of both sub-groups were same in the profile of demography and risk factors after surgery and operative variables. In spite of the homogeneity among patients, it is much amazing to examine that patients who had to undergo operation by single clamp method (n: 67) were clearly protected from some complications as no patient among them developed the complications related to neurology. Four out of total one hundred and twenty-nine patients who underwent surgery by multiple clamp method developed complications related to neurology.

Table-IV: Single Vs Multiple Clamp Technique Single Surgeon (N=196).

Group	Neurological Complication	No Neurological	Row Total
Single Clamp	0.00	67.00	67.00
Multiple Clamp	4.00	125.00	129.00
Column Total	4.00	192.00	196.00

DISCUSSION:

There is very devastating impact of the complication of neurological issues of CABG (Coronary Artery Bypass Grafting) on the patient's life as well as treatment expense. We conventionally classified these complications as Type-1 and Type-2. The complications of Type-1 are the results from damage to brain resulted by embolic stroke, intra-cerebral bleeding and present as coma, stupor or paralysis while the complications of Type-2 include reduced intellectual functions or seizures. There is significant variation in the rate of prevalence reported in this very literature. Roach stated a rate of prevalence of

6.10% in his research work on more than two thousand patients who underwent surgery at twenty-four different institute in USA. SYNTAX research work have displayed 2.20% prevalence of early stroke in CABG (Coronary Artery Bypass Grafting) versus 0.60% in PCI. Newman has stated a post-surgical prevalence of cognitive decline up to 53.0% which normally got improvement over next six months but it persists in twenty-four percent patients. Cognitive alterations are much subtle and require skillful assessment. During the sessions of counselling by cardiologists, patients normally discover these figures so threatening that they tend to give preference PCI

over CABG (Coronary Artery Bypass Grafting). This is the most important cause that drug eluting stents have caused up to 20.0% reduction in referral for the CABG (Coronary Artery Bypass Grafting).

Several mechanisms are responsible for the neurological injuries in the CPB like hyper-perfusion, systemic inflammatory response and micro-embolism. CABG (Coronary Artery Bypass Grafting) has association with very low incidence of complications related to neurology. Unluckily, this benefit of CABG (Coronary Artery Bypass Grafting) is not proved by the available evidences. Sabban claimed that On-pump beating heart operation which end the usage of the cross clamp which will give the protection against neurological complications. Another research work conducted on more than two thousand patients present with coronary revascularization, Patel stated the incidence of focal neurological deficit to be 1.60% in the patients of On-pump group, 0.50% among the patients of Off-pump without the patients of group of aortic manipulation whereas 0.40% in the Off-pump with group of the patients of aortic manipulation ($P = 0.0270$).

CONCLUSION:

There can be reduction in the prevalence of the complications related to neurology with the adaptation of the proper and suitable measures for prevention. The utilization of the single clamp method may be cause of the low rate of prevalence of stroke in this research work.

REFERENCES:

1. Devgun, J. K., Gul, S., Mohanane, D., Jones, B. M., Hussain, M. S., Jobanputra, Y., ... & Kapadia, S. R. (2018). Cerebrovascular events after cardiovascular procedures: risk factors, recognition, and prevention strategies. *Journal of the American College of Cardiology*, 71(17), 1910-1920.
2. Alexander, J. H., & Smith, P. K. (2016). Coronary-artery bypass grafting. *New England Journal of Medicine*, 374(20), 1954-1964.
3. Raza, S., Sabik III, J. F., Ainkaran, P., & Blackstone, E. H. (2015). Coronary artery bypass grafting in diabetics: a growing health care cost crisis. *The Journal of thoracic and cardiovascular surgery*, 150(2), 304-312.
4. Bagheri, S., Shahbazi, S., Shafa, M., Borhani-Haghighi, A., Kiani, M., & Sagheb, M. M. (2018). The Effect of Remote Ischemic Preconditioning on the Incidence of Acute Kidney Injury in Patients Undergoing Coronary Artery Bypass Graft Surgery: A Randomized Controlled Trial. *Iranian journal of medical sciences*, 43(6), 587.
5. Pinho-Gomes, A. C., & Taggart, D. P. (2017). Coronary artery bypass grafting for left main disease and the risk of stroke: Incidence, aetiology and prevention. *The Surgeon*, 15(3), 155-160.
6. Chu, D., Schaheen, L., Morell, V. O., Gleason, T. G., Cook, C. C., Wei, L. M., & Badhwar, V. (2016). Effect of aortic clamping strategy on postoperative stroke in coronary artery bypass grafting operations. *JAMA surgery*, 151(1), 59-62.
7. Newman MF, Kirchner JL, Phillips-Bute B, Gaver V, Grocott H, Jones RH. Neurological Outcome Research Group and the Cardiothoracic Anesthesiology Research Endeavors Investigators. Longitudinal assessment of neurocognitive function after coronary-artery bypass surgery. *N Engl J Med*. 2001;344(6):395-402. doi: 10.1056/NEJM200102083440601.
8. Ferreira AC, Peter AA, Salerno TA, Bolooki H, de Marchena E. Clinical impact of drug eluting stents in changing referral practices for coronary surgical revascularization in a tertiary care center. *Ann Thorac Surg*. 2003;75(2):485-489. doi: 10.1016/S0003-4975(02)04367-9
9. Baufreton C, Allain P, Chevailler A, Etcharry-Bouyx F, Corbeau JJ, Legall D, et al. Brain injury and neuropsychological outcome after coronary artery surgery are affected by complement activation. *Ann Thorac Surg* 2005; 79:1597-1605.
10. Gol JP, Charlson ME, Williams-Russo P, Szatrowski TP, Peterson JC, Pirraglia PA, et al. Improvement of outcomes after coronary artery bypass: a randomized trial comparing intra-operative high versus low mean arterial pressure. *J Thorac Cardiovasc Surg* 1995; 110:1302-1311; comment 1311-1304.
11. Pugsley W, Klinger L, Paschalis C, Treasure T, Harrison M, Newman DP. The impact of microemboli during cardiopulmonary bypass on neuropsychological functioning. *Stroke*. 1994; 25:1393-1399.
12. Hammon JW Jr, Stump DA, Kon ND, Cordell AR, Hudspeth AS, Oaks TE et al. Risk factors and solutions for the development of neurobehavioral changes after coronary artery bypass grafting. *Ann Thorac Surg*. 1997; 63:1613-1618. doi: 10.1016/S0003-4975(97)00261-0
13. van Dijk D, Jansen EWL, Hijman R, Nierich AP, Diephuis JC, Moons KGM et al. Cognitive outcome after off-pump and on-pump coronary artery bypass graft surgery. A randomized trial.

- JAMA. 2002;287;1405-1412. doi:10.1001/jama.287.11.1405.
14. Al-Ruzzeh S, Nakamura K, Athanasiou T, Modine T, George S, Yacoub M et al. Does off-pump coronary artery bypass (OPCAB) surgery improve the outcome in high-risk patients? A comparative study of 1398 high-risk patients. *Eur J Cardiothorac Surg.* 2003; 23:50-55. doi: 10.1016/S1010-7940(02)00654-1
 15. Muneretto C, Bisleri G, Negri A, Manfredi J, Metra M, Nodari S, et al. Off-pump coronary artery bypass surgery technique for total arterial myocardial revascularization: A prospective randomized study. *Ann Thorac Surg.* 2003; 76:778-782. doi: 10.1016/S0003-4975(03)00564-2
 16. Sabban MA, Jalal A, Bakir BM, Alshaer AA, Abbas OA, Abdal- Aal MM, et al. Comparison of neurological outcomes in patients undergoing conventional coronary artery bypass grafting, on-pump beating heart coronary bypass, and off-pump coronary bypass. *Neurosciences.* 2007;12 (1):35-41.
 17. Patel NC, Deodhar AP, Grayson AD, Pullan M, Keenan D, Hasan R, et al. Neurologic outcomes in coronary surgery: Independent effect of avoiding cardiopulmonary bypass. *Ann Thorac Surg.* 2002; 74:400-405. doi: 10.1016/S0003-4975(02)03755-4.
 18. Nakamura, Y., Nakajima, H., Morita, K., Okada, N., Tabata, M., Koike, H., ... & Kimura, F. (2016). Tailoring graft strategy to calcification severity of aorta in off-pump coronary artery bypass grafting. *Cardiovascular and Thoracic Open*, 2, 2055552016650795.
 19. Kang, S. H., Ahn, J. M., Lee, C. H., Lee, P. H., Kang, S. J., Lee, S. W., ... & Park, S. J. (2017). Differential event rates and independent predictors of long-term major cardiovascular events and death in 5795 patients with unprotected left main coronary artery disease treated with stents, bypass surgery, or medication: insights from a large international multicenter registry. *Circulation: Cardiovascular Interventions*, 10(7), e004988.
 20. Engelman, R. M., & Engelman, D. T. (2015, March). Strategies and devices to minimize stroke in adult cardiac surgery. In *Seminars in thoracic and cardiovascular surgery* (Vol. 27, No. 1, pp. 24-29). WB Saunders.
 21. Nicolini, F., Fortuna, D., Contini, G. A., Pacini, D., Gabbieri, D., Zussa, C., ... & Gherli, T. (2017). The impact of age on clinical outcomes of coronary artery bypass grafting: long-term results of a real-world registry. *BioMed research international*, 2017.