Effects of Hypothermia on Renal Functions for Patients undergo Coronary Artery Bypass Graft Surgery

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المستخلص

الهدف: التعرف على تأثير انخفاض حرارة المرضى على وظائف الكلية للمرضى الخاضعين لعملية زرع الشرايين القلبية.
المنهجية: اختيرت عينة غرضيه (غير احتمالية) تكونت من (٥٠ مريضا) من مرضى عملية زرع الشرايين التاجية والذين ادخلوا بالتتابع إلى ردهة الجراحة القلبية وتم متابعة المرضى في صالة العمليات وفي وحدة العناية المركزة وفي ردهة الجراحة القلبية بعد عملية زرع الشرايين التاجية. تم تحديد تحاليل وظائف الكلية في الأسبوع الأول بعد العملية (نسبة ترشيح كبيبات الكليتين بالاعتماد على معادلة Crockroft-Gault مستوى الكرياتنين في الدم) و صنفت وظائف الكلية بعد العملية استنادا إلى قمة مستوى الكرياتنين في الدم والهبوط بنسبة ترشيح كبيبات الكليتين كالآتي: وظائف كلية طبيعية (أي زيادة مستوى الكرياتنين في الدم وهبوط نسبة ترشيح كبيبات الكليتين اقل من ٢٥% من قبل العملية، عجز كلوي متوسط بزيادة مستوى الكرياتنين في الدم وهبوط نسبة ترشيح كبيبات الكليتين أكثر من ٢٥% إلى ٥٠% من قبل العملية، عجز كلوي شديد بزيادة مستوى الكرياتنين في الدم وهبوط نسبة ترشيح كبيبات الكليتين أكثر من ٥٠% من قبل العملية.
النتائج: أظهرت الدراسة (٧٨%) من العينة تطور لديهم عجز كلوي بعد العملية، النسبة العالية منهم كانت: من الذكور(٥٠%)، التقدم في العمر ٦٠-٧٠ سنة(٦٠%)، التدخين(٤٧%)، مرضى السكري(٦٨%)، وقت ماكينة القلب والرئة الصناعي أكثر من ١٨٠دقيقة(٥٧%)، الفئة الثالثة من تصنيف جمعية القلب الأمريكية في نيويورك لمرض القلب (٤٧,٥%) و عدم استخدام مضخة المنفاخ داخل الابهر (٥٠%).نستنتج من الدراسة بأن المرضى الخاضعين لجراحة زرع الشرايين التاجية قد تتطور لديهم عجز الكلية بعد العملية حتى مع استخدام إستراتيجية خفض حرارة المريض كوسيلة حماية وان مرضى السكري، المرضى الذكور، التقدم في العمر، التدخين، وقت ماكينة القلب والرئة الصناعي أكثر من ١٨٠ دقيقة، الصنف الثالث من تصنيف جمعية القلب الأمريكية في نيويورك لمرض القلب و عدم استخدام مضخة المنفاخ داخل الابهر تعتبر عوامل خطورة رئيسية للعجز الكلوي بعد العملية.
التوصيات: أوصى الباحث بإيجاد إستراتيجية إضافية بالإضافة لخفض الحرارة لحماية الكلية خاصة مع المرضى ذوي الخطورة العالية للإصابة بالعجز الكلوي بعد عملية زرع الشرايين التاجية.

Abstract

Objective: To determine the effectiveness of hypothermia on renal functions for patients undergoing coronary artery bypass graft CABG surgery.

Methodology: A purposive (non-probability) sample of (50) patients undergoing Isolated coronary artery bypass graft surgery consecutively admitted to the surgical ward, and they were followed up in the intraoperative, Intensive Care Unit (ICU) and in the postoperative (surgical ward). Post-operative renal function test (glumeruler filteration rate (GFR) by using the Crockroft-Gault formula and serum creatinine level) was determined first week post operative and post operative renal function was classified on the base of peak of the serum creatinine level and decline of glomeruler filteration rate(GFR) as following : normal renal function serum creatinine concentration and decline in(GFR) less than 25% from preoperative, moderate renal dysfunction increase serum creatinine concentration and decline in(GFR) 25%-50% from preoperative, sever renal dysfunction increase serum creatinine concentration and decline in(GFR) more than 50% from preoperative test.

Results: results of this study show that (78%) from the sample develop post operative renal dysfunction and the highly percentage of them are male (50%), advance age 60-70 (60%), smoking (47.0%), diabetes mellitus DM (68%), cardiopulmonary bypass 180 and more (57.20%), New York Heart Association calcification NYHA class III(47.5%) and patient without Intra Aortic Balloon Pump IABP(50,0%) . We conclude from the study that highly percentage of patient undergoing isolated CABG may develop postoperative renal dysfunction even when using hypothermic strategy as a protective measure and the patients with DM, male, advance age, smoker, prolong time of CPB (more than 180 minutes), NYHA class III and patient without IABP are considered as patient at high risk to develop postoperative renal dysfunction.

Recommendations: The researcher recommended that to find addition strategy rather than hypothermia to protect renal function especially with the high risk patients during isolated CABG surgery.

Keywords: Renal dysfunction, coronary artery bypass graft (CABG) surgery, Hypothermia

Introduction:

Renal injury after cardiac operations is associated with increased death, need for dialysis, and longer intensive care unit and hospital length of stay [1] , and also it is a serious complication of coronary revascularization with cardiopulmonary bypass (CPB) and results in increased mortality and morbidity. The overall mortality after open-heart surgery ranges between 2 and 8% [2].Thakar [3] reported that the risk for mortality increases exponentially among patients who develop postoperative acute renal failure (ARF), with mortality rates in excess of 60%.In Iraq there are seven centers operating open heart surgery. Three of these centers are in Baghdad operated 1106 open heart surgery in 2010 including 356 cases coronary artery bypass graft CABG [4].The condition of patients in the early postoperative period is usually improved with off pump Coronary Artery Bypass (OPCAB) surgery compared with on-pump surgery. The duration of ventilatory support, intensive care unit (ICU) length of stay, and hospital length of stay are significantly diminished as shown in several studies [5].Bonventre [6] stated that the survival rate associated with acute renal failure (ARF) has remained dismal over the past few decades; multiple attempts at therapeutic interventions have failed to demonstrate clear benefits in either amelioration of renal injury or improved survival. The promise indicated by successful interventions in experimental models suggests that the proposed intervention should come early, possibly within 24 to 48 hours after inducing renal injury. Bridges[7] suggested that the renal injury is extremely difficult to translate early interventions into clinical trials because it is difficult to anticipate renal dysfunction, and use of surrogate markers of glumeruler filtration rate (GFR) as current indicators of acute renal dysfunction leads to a significant delay in the diagnosis of ARF. Elizabeth [8] reported that acute renal failure (ARF) requiring dialysis after coronary artery bypass grafting (CABG) occurs in 1 to 5% of patients and is independently associated with postoperative mortality, Renal insufficiency may be related to advanced age, hypertension, diabetes, decreased function of the left ventricle, and length of time on the CPB [9] . Caron and Sandra [10] reported that one indicator of effective cardiac output is adequate renal perfusion as evidenced by urinary output of at least 0.5 mL/kg/h. The objective of this study was to determine the effectiveness of hypothermia on renal functions for patient undergoing CADG surgery.

Methodology:

A descriptive study has been used through the present study during the period from 1st February 2011 to 1st October 2011. In order to obtain valid and comprehensive data, the study was conducted in preoperative, intra operative and post operative (intensive care unit and surgical word) at surgical department in the Iraqi Center of Heart Diseases. Questionnaire interview and measurement was designed and developed by the researcher for the purpose of this study .The questionnaire consisted of (3) parts. The first part was approached one-day before the surgery. This included gender, age, smoking, living with smoker persons and alcohol drinking.

Clinical characteristics form included: Past medical history consist from Hypertension and Diabetes Mellitus, past surgical history of open heart surgery and kidney surgery, Left ventricle ejection fraction was categories for each patient as less than 50% or more than 50% , renal function tests (glomeruler filteratin rate and serum creatinine) and (New York heart association, NYHA) classification. Intra operative sheet consists of (7) items include: Duration of surgery which consisted of <300minute and >300, cardiopulmonary bypass time which lasted 60-119 minutes, 120-179 minutes and more than 180minutes , aortic cross clamp time which lasted from less than 50 minutes, 50-59 minutes, 60-69 minutes, 70-79minutes and more than79 minutes, core temperature during of cardiopulmonary bypass which consisted from (28, 29,30 ºC), used of Intra Aortic Balloon Pump, total fluid intake which consisted from 500-1000ml, >1000-2000ml,

>2000ml and total urine output which consisted from 500-1000ml, >1000-2000ml,>2000ml.

Intensive care unit sheet consists of (5) items include: Data which were collected during the first eight hours postoperatively at the recovery room from each patient. Patient vital signs (temperature, heart rate, systolic blood pressure, diastolic blood pressure), use of intra aortic balloon pump ,total fluid intake 500-1000ml, >1000-2000ml, >2000ml ,total urine output which consisted of 500-1000ml, >1000-2000ml,>2000ml and laboratory tests (glomeruler filteration rate, serum ceriatinine).

Surgical word sheet consists of the laboratory tests serum creatinine (SC) and glumeruler filteration rate (GFR).

Post Operative Renal Function Test (first week post operative):

glumeruler filteration rate (GFR) was determined using the Crockroft-Gault formula:

GFR= (140 – age) × wt. ÷ (Scr × 72)

In female:

GFR= (140 – age) × wt. ÷ (Scr × 72) × 0.85

Post operative renal function was classified on the base of peak of the serum creatinine level and decline of glomeruler filteration rate (GFR) as following : normal renal function increase serum creatinine concentration and decline in(GFR) less than 25% from preoperative, moderate renal dysfunction increase serum creatinine concentration and decline in(GFR) 25%-50% from preoperative, sever renal dysfunction increase serum creatinine concentration and decline in(GFR) more than 50% from preoperative. Serum Creatinine was measured in the hospital laboratory by taken blood samples from the patient and centerfus it and analyzes the serum with Reflotron plus devise.

Statistical Analysis:

The data of present study were analyzed through the application of two statistical approaches. A descriptive statistical approach that includes Frequency, Percentage, Arithmetic means (X) ,Mean of scores, Standard deviation (SD),and an Inferential statistical approach that includes Chi-Square test for testing a non-restricted frequency table.2-Contingency Coefficients (C.C); Binomial test. Results were determined as highly significant at (P<0.01) significant at (P<0.05) and non significant at (P>0.05).

Results:

Table 1. Preoperative Data (Demographic Characteristics) of 50 Patients Undergoing (CABG) Surgery.

	Groups	Frequency	Percent	C.S. P-value
Gender	**Male**	**42**	**84**	**Binomial P≤0.000 HS**
	Female	**8**	**16**	
Age Groups [years]	**40 -49**	**4**	**8**	**χ2= 15.52 P≤0.000 HS**
	50 -59	**26**	**52**	
	60 – 70	**20**	**40**	
Statistics	**Mean ± SD**	**57.68 ± 5.74 [years.]**		
Smoking	**Yes**	**34**	**68**	**Z=10.308 P<0.01 HS**
	No	**16**	**32**	
Living with smoker person	**Yes**	**19**	**38**	**Z=5.536 P<0.01 HS**
	No	**31**	**62**	
Alcohol drinking	**Yes**	**0**	**0**	**O.C.**
	No	**50**	**100**	

C.S=Comparative significant; H.S= highly significant; χ =Chi-Squire's, O.C = Out of Comparative; P = Probability Value; SD=Stander Deviation: Z= Z –test.

Table 1. Shows that the majority of patients were male 42(84%), 26(52%) with in age group (50-59), 34(68%) smokers, 31 (62%) not living with smoker person, 50(100%) non-alcohol drinker.

Table 2. Distribution of Preoperative Data (Demographic Characteristics) of 50 Patients Undergoing (CABG) Surgery within the First Week Postoperative Renal Function Test.

Variable	Groups	Frequency & percents	The First week post operative Renal Function Test				Total	C.S. P-value
			Normal renal function	Moderate renal dysfunction	Sever renal dysfunction	Total renal dysfunction		
Gender	Male	Frequency	21	10	11	21	42	C.C.= 0.278 P= 0.124 NS
		% Gender	50.0%	23.8%	26.2%	50.0%	100.0%	
	Female	Frequency	7	1	0	8	8	
		% Gender	87.5%	12.5%	0.0%	12.5%	100.0%	
Age Groups (years)	40 -49	Frequency	4	0	0	0	4	C.C.= 0.386 P=0.067 NS
		% Age Groups (years)	100.0%	0.0%	0.0%	0%	100.0%	
	50 -59	Frequency	16	7	3	10	26	
		% Age Groups (years)	61.5%	26.9%	11.5%	38.5%	100.0%	
	60 - 70	Frequency	8	4	8	12	20	
		% Age Groups (years)	40.0%	20.0%	40.0%	60.0%	100.0%	
Smoking	Yes	Frequency	18	8	8	16	34	C.C.= 0.089 P=0.817 NS
		% Smoking	53.0%	23.5%	23.5%	47.0%	100.0%	
	No	Frequency	10	3	3	6	16	
		% Smoking	62.5%	18.8%	18.8%	37.5%	100.0%	
Living with smoker persons	Yes	Frequency	11	6	2	8	19	C.C.= 0.243 P=0.209 NS
		% Living with smoker persons	57.9%	31.6%	10.5%	42.1%	100.0%	
	No	Frequency	17	5	9	14	31	
		% Living with smoker persons	54.8%	16.1%	29.1%	45.2%	100.0%	

Normal renal function = > 25% increase in serum creatinine and decrease in glomeruler filtteration rate(GFR) than base line; Moderate renal dysfunction = 25 -50 % more than base line; Sever renal dysfunction =< 50 % more than base line; C.S=Comparative significant ;%=percentage ; P.=probability value.; N.S= No significant ; (C.C) Contingency Correlation .var. = variable.

Table 2. presents the distribution of preoperative demographic characteristics of 50 patients undergoing (CABG) surgery according to the first week post-operative renal function test, it shows that male in gender(50%) ,advance age 50-59 (38.5%) 60-70 (60%), smoking (47.0%) develop high incidence of renal dysfunction post-operative.

Table 3. Description of Clinical Characteristics of 50 Patients Undergoing CABG Surgery within the First Week Postoperative Renal Function Test.

Variable	Groups	Frequency & percents	The First week post operative Renal Function Test				Total	C.S. P-value
			Normal renal function	Moderate renal dysfunction	Sever renal dysfunction	Total renal dysfunction		
Hypertension	Yes	Frequency	11	4	6	10	21	C.C.=0.136 P=0.625 NS
		% Hypertension	52.4%	19.0%	28.6%	47.6%	100.0%	
	No	Frequency	17	7	5	12	29	
		% Hypertension	58.6%	24.2%	17.2%	41.4%	100.0%	
Diabetes mellitus	Yes	Frequency	8	10	7	17	25	C.C.=0.459 P=0.001 HS
		% Diabetes mellitus	32.0%	40.0%	28.0%	68%	100.0%	
	No	Frequency	20	1	4	5	25	
		% Diabetes mellitus	80.0%	4.0%	16.0%	20%	100.0%	
Pre Operative Renal dysfunction	Yes	Frequency	3	0	0	0	3	C.C.=0.219 P=0.285 NS
		% Pre Operative Renal dysfunction	100.0%	0.0%	0.0%	0.0%	100.0%	
	No	Frequency	25	11	11	24	47	
		% Pre Operative Renal dysfunction	53.2%	23.4%	23.4%	46.8%	100.0%	
Ejection fraction	< 50 %	Frequency	5	1	3	4	9	C.C.= 0.155 P=0.540 NS
		% Ejection fraction	55.6%	11.1%	33.3%	44.4%	100.0%	
	> 50%	Frequency	23	10	8	18	41	
		% Ejection fraction	56.1%	24.4%	19.5%	43.9%	100.0%	
NYHA (New York Heart Association)	Class - II	Frequency	7	1	2	3	10	C.C.= 0.158 P=0.528 NS
		% NYHA (New York Heart Association)	70.0%	10.0%	20.0%	30.0%	100.0%	
	Class - III	Frequency	21	10	9	19	40	
		% NYHA (New York Heart Association)	52.5%	25.0%	22.5%	47.5%	100.0%	

Normal renal function = > 25% increase in serum creatinine and decrease in glomeruler filtteration rate (GFR) than base line; Moderate renal function = 25 -50 % more than base line; Sever renal function =< 50 % more than base line; C.S=Comparative significant ;%=percentage ; P=probability value.; N.S= No significant ;min=minute; (C.C)Contingency Correlation ; >= less than; <=more than. ºC = centigrade. Var. = variable.

It appears from table -3- that the highest percentage of post operative renal dysfunction presents in patients with Diabetes mellitus (68%), pre operative renal dysfunction (46.8%) and advance stage of New York Heart Association calcification class II (30.0%), class III (47.5%).

Table 4. Description of 50 Patients Undergoing (CABG) in the Intra Operative within the First Week Post Operative Renal Function Test.

Variable	Groups	Frequency & percents	The First week post operative Renal Function Test				Total	C.S. P-value
			Normal Renal Function	Moderate renal dysfunction	Sever renal dysfunction	Total renal dysfunction		
Duration of surgery (min.)	< 300min.	Frequency	15	5	5	10	25	C.C.= 0.080 P= 0.850 NS
		% Duration of surgery (min.)	60.0%	20.0%	20.0%	40.0%	100.0%	
	> 300 min.	Frequency	13	6	6	12	25	
		% Duration of surgery (min.)	52.0%	24.0%	24.0%	48.0%	100.0%	
Cardio pulmonary bypass time (Minute)	60-119	Frequency	3	0	0	0	3	C.C.= 0.284 P=0.256 NS
		% Cardio pulmonary bypass time (min)	100.0%	0.0%	0.0%	0.0%	100.0%	
	120-179	Frequency	22	8	10	18	40	
		% Cardio pulmonary bypass time (min)	55.0%	20.0%	25.0%	45.0%	100.0%	
	180and more	Frequency	3	3	1	4	7	
		% Cardio pulmonary bypass time (min)	42.8%	42.9%	14.3%	57.2%	100.0%	
Aortic cross-clamp time (Minute)	< 50	Frequency	6	1	0	1	7	C.C.= 0.351 P= 0.532 NS
		% Aortic cross-clamp time (Minute)	85.7%	14.3%	0.0%	14.3%	100.0%	
	50 – 59	Frequency	6	1	1	2	8	
		% Aortic cross-clamp time (Minute)	75.0%	12.5%	12.5%	25.0%	100.0%	
	60 – 69	Frequency	7	5	6	11	18	
		% Aortic cross-clamp time (Minute)	38.9%	27.8%	33.3%	61.1%	100.0%	
	70 – 79	Frequency	5	3	3	6	11	
		% Aortic cross-clamp time (Minute)	45.5%	27.3%	27.3%	54.6%	100.0%	
	80 >	Frequency	4	1	1	2	6	
		% Aortic cross-clamp time (Minute)	66.7%	16.7%	16.7%	33.4%	100.0%	
Core temperature during cardiopulmonary bypass (ºC)	28	Frequency	1	0	0	0	1	C.C.= 0.338 P= 0.167 NS
		% Core temperature during of cardiopulmonary bypass (Cen.)	100.0%	0.0%	0.0%	0.0%	100.0%	
	29	Frequency	12	1	2	3	15	
		% Core temperature during of cardiopulmonary bypass (Cen.)	80.0%	6.7%	13.3%	20.0%	100.0%	
	30	Frequency	15	10	9	19	34	
		% Core temperature during of cardiopulmonary bypass (Cen.)	44.1%	29.4%	26.5%	55.9%	100.0%	

Table 4. (Continued)

Used of intra aortic balloon pump (IABP)	Yes	Frequency	11	3	2	5	16	C.C.= 0.184 P= 0.415 NS
		% Used of intra aortic balloon pump (IABP)	68.8%	18.8%	12.5%	31.3%	100.0%	
	No	Frequency	17	8	9	17	34	
		% Used of intra aortic balloon pump (IABP)	50.0%	23.5%	26.5%	50.0%	100.0%	
Total urine output during surgery (Ml/surgery).	500 – 1000	Frequency	1	0	1	1	2	C.C.= 0.318 P=0.229 NS
		% Total urine output during surgery (ml/hour).	50.0%	0.0%	50.0%	50.0%	100.0%	
	>1000 – 2000	Frequency	20	10	5	15	35	
		% Total urine output during surgery (ml/hour).	57.1%	28.6%	14.3%	42.9	100.0%	
	> 2000	Frequency	7	1	5	6	13	
		% Total urine output during surgery (ml/hour).	53.8%	7.7%	38.5%	46.2	100.0%	

Normal renal function = > 25% increase in serum creatinine and decrease in glomeruler filtteration rate (GFR) than base line; Moderate renal function = 25 -50 % more than base line; Sever renal function =< 50 % more than base line; C.S=Comparative significant ;%=percentage ; P=probability value.; N.S= No significant ;min=minute; (C.C)Contingency Correlation ; >= less than; <=more than. ºC = centigrade. Var. = variable.

It appear from the table-4- that the highest percentage in renal dysfunction post operative occurs in patients with prolonged time of Cardiopulmonary Bypass 120-179 (45%), 180 minute and more (57.2%), patient without Intra Aortic Balloon Pump (50%) compare with patient with IABP (31.3).

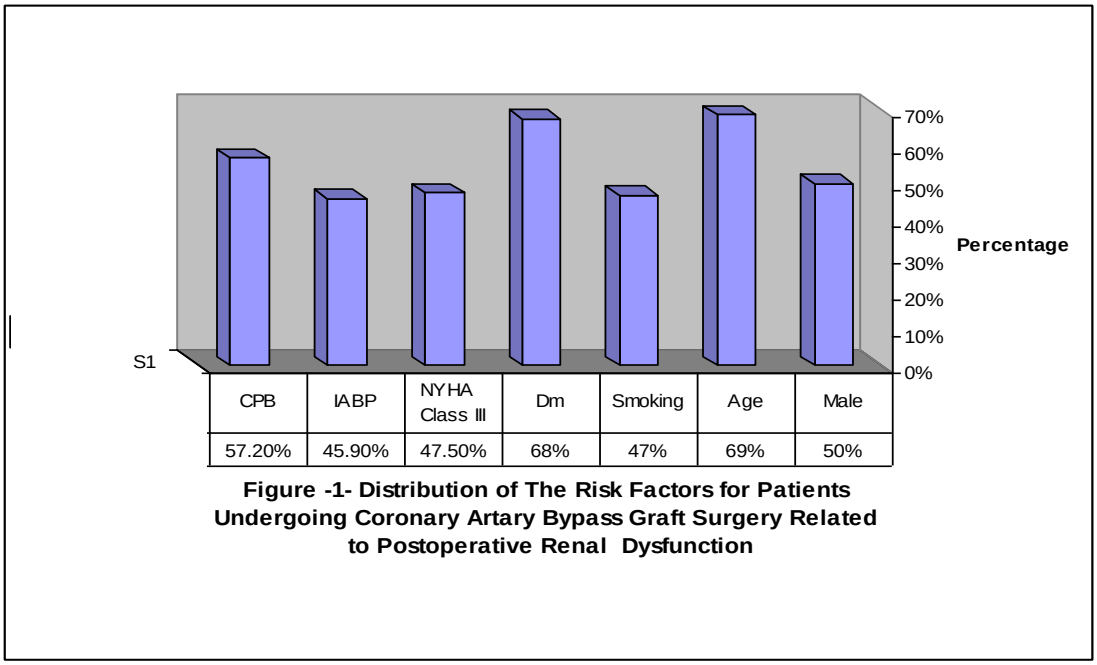

Figure -1- Distribution of The Risk Factors for Patients Undergoing Coronary Artary Bypass Graft Surgery Related to Postoperative Renal Dysfunction

This figure presented the distribution of the risk factors for patients undergoing CABG surgery related to post operative renal dysfunction, its show that prolonged time of CPB, patient without IABP, NYHA class III , DM patient, smokers , advance age and male developed high incidence compare with others patients .

Discussion:

According to their gender the results of present study reported that the majority of the patients were males while the females were (16%) from the patient that undergoing the isolated CABG surgery (table-1-).The prevalence of postoperative renal dysfunction shows that high percentage in male (50.0%) compared with (12.5%) in female (table-2-) .The fact of male patients are more than female patients found in many researches, Nael 2008 [11]who stated that in his cohort study (n = 2,587) consisted of 531 female and 2,056 male patients undergoing coronary artery bypass graft (CABG) surgery. Christina [12] revealed in her study that (527) patients from the sample were female, (41) patients only developed renal dysfunction post operative. Sophi [13] stated that sex was not associated with post operative renal dysfunction. The results of our study show that the highly percentage (60.0%) development of post operative renal dysfunction increased with advance age, 60-70 years old (table-2-) this is supported by Hussain [14] who reported that the proportion of patient developing renal dysfunction post operative increased with advance age 10% in their 60s, 15 % in those 70s and about 25% are older than 80s years old.

Reeykumar [15] reported that from the analysis of risk factors one of the variables emerged as independent predictors of post operative renal dysfunction is advanced age. The researcher found that renal failure is more likely to occur in older patients, they may be susceptible to develop renal dysfunction because of an aging kidney lose its function and the ability to withstand acute insult that may resulted from the operation and may have reduced ability to cope with critical circulation. Concerning smoking our results revealed that highly percentage of smoker patients (47.0%) develop postoperative renal dysfunction compared with non smokers (37.5%), Regarding to the living with smoker person (42.1%) of the sample expert post operative renal dysfunction. Doddakula [16] reported that smoking and diabetes associated with post operative renal dysfunction for patients undergoing on-pump coronary artery bypass, which gives a higher rates of complications and mortality. Dependent on the result of the present study, the researcher found that the smoking is associated with postoperative renal dysfunction for the patients with isolated CABG surgery which may be independent risk factor for post operative renal dysfunction.

Regarding to their hypertension (Table 3) by analyzing the result of the patients, we found that there is no significance difference between hypertensive and non hypertensive patients related to post operative renal dysfunction, (47.6%) of patients with hypertension compared with (41.4%) patient without hypertension expert post operative renal dysfunction.

According to their Diabetes Mellitus the result of this study shows highly percentage of diabetes mellitus patients (68%) with high significance at P .value = 0.001 show renal dysfunction post operative. Nalysnyk [17] emphased the several risk factors for impairment of renal function after coronary artery bypass grafting (CABG) have been identified, such as female sex, age, diabetes mellitus, hypertension.

Marzia [18] reported that the same result was obtained in patients having only hypertension and in patients having both diabetes and hypertension, producing no significant changes on them. The researcher believes that the patients with diabetes mellitus undergoing cardiac surgery are at a greater risk for developing post operative renal dysfunction and of decreased survival postoperatively compared with patients without diabetes. This result may be due to the effect of diabetes millets disease on the kidneys such as diabetes nephropathy or parenchyma disease which increases the risk of damage resulting from CPB on post operative renal function. Concerning preoperative renal dysfunction our results showed that patient with pre operative renal dysfunction developed postoperative renal dysfunction (46.8%) rather than patient without preoperative renal dysfunction, This is supported by Previous studies [19.20] have shown that preoperative mild renal failure has significant impact on early and late outcomes

in patients underwent CABG surgery, Schiffrin [21] emphased the postoperative renal dysfunction was more frequent (19.4%) verses(11.4%) patient without preoperative renal dysfunction at P<0.001.Simon [22]

Concerning ejection fraction the results of the present study show that patients with poor left ventricle function (ejection fraction less than 50%) developed post operative renal dysfunction (44.4%) compared with patient with more than 50% of ejection fraction (43.9%). (Table-4-) Zakeri [24] reported preoperative left ventricular dysfunction is a major risk factor for postoperative renal dysfunction and mortality. By researcher opinion poor LV function decreases the cardiac output that may lead to renal hypoperfusion which leads to renal ischemia.

According to the classification of the New York Health Association (47.5%) from the patients with class III and (30.0%) from class II have post operative renal dysfunction (Table 4). Supported by

Sophi [13] who reported that the proportion of patient developed post operative renal dysfunction increased with congestive heart failure defined by New York Heart Association as class III or class IV criteria.

Post operative renal function deterioration has been associated with poor cardiac output which may result from left ventricular dysfunction. These post operative events of preoperative cardiac status instability presented with ejection fraction less than 50% and class III or class IV of New York Health Association classification (figure-1-). Low ejection fraction and NYHA class III and class IV heart failure may further decrease renal perfusion and increase the incidence of renal ischemic damage that make renal more jeopardy to CPB events.

Recommendations:

1. The incidence of acute renal failure following CABG surgery is rising, suggesting that current strategies used to prevent this problem may not be as effective as previously thought and that new approaches are needed, a new study may suggested.
2. Further research is needed to identify risk factors for postoperative morbidity and reported that preoperative renal insufficiency and postoperative hypotension are the most important independent risk factors for ARF in post cardiac surgical patients. This agrees with Litmathe etal., 2009[23] who reported that mortality in patients undergoing cardiac surgery.
3. Quitting smoking in the preoperative period should be emphasized, and active smoking cessation counseling should be continued postoperatively.
4. There is a need to find another strategy rather than moderate hypothermia to protect the renal during isolated CABG surgery.

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