

Study of Atrial Fibrillation and Venous Thromboembolism in Critically Ill Patients in Intensive Care Unit

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Abstract:

Background: atrial fibrillation (AF) is the most common arrhythmia in patient hospitalized in ICU and is associated with increased morbidity and mortality. Venous Thromboembolism (VTE), including deep venous thrombosis (DVT) and pulmonary Embolism (PE), is recognized as a common complication in critically ill patients. Risk factors including critical illness, mechanical ventilation, sedative medications and central venous catheter insertion are major contributing factors to the high risk of VTE. **Objective:** it was to evaluate the causes and outcomes of AF and VTE in patients admitted to intensive care unit due to non-cardiac causes. We studied 143 consecutive patients admitted to ICU for non-cardiac emergencies. **Results:** only 48 (33.5 %) patients were complicated. AF is the most common complication happened in 27 patients (56 %) of complicated cases; pulmonary embolism comes next with 13 patients (27.1%) of complicated cases, DVT in the third place with 8 patients (16.6 %) of complicated cases. The age of patients admitted to ICU was directly related to complication happened in ICU, the older the patient is the more he is vulnerable to complications, the increased body mass index and increased weight was directly related to complications, the hemoglobin level is strongly related to cardiac complications. There was increased risk of DVT and pulmonary embolism due to prolonged bed ridden state.

Conclusion: patients of ICU who have a higher risk than other for adverse cardiac complications, the most common cardiac complications are AF, DVT and pulmonary embolism and finally cardiac complications leads to increased rate of mortality and morbidity.

Keywords: Atrial Fibrillation, Venous Thromboembolism, Intensive Care Unit.

Introduction:

Atrial fibrillation (AF) is the most common arrhythmia in patients hospitalized in intensive care units (ICUs) and is associated with increased morbidity and mortality. Most frequently, the diagnosis of the underlying arrhythmia is possible from the physical examination, the response to maneuvers or drugs, and the 12-lead surface electrocardiogram⁽¹⁾.

Twelve leads electrocardiogram is the corner stone to identify the rhythm of tachyarrhythmia, presence of pre-excitation, Brady arrhythmias and heart blocks.⁽²⁾

Cardiac arrhythmias are a common problem encountered in the intensive care unit (ICU) and represent a major source of morbidity. The inciting factor for an arrhythmia in a given patient may be an insult such as hypoxia, infection, cardiac ischemia, catecholamine excess (endogenous or exogenous), or an electrolyte abnormality⁽³⁾.

Venous thromboembolism (VTE), including deep venous thrombosis (DVT) and pulmonary embolism (PE), is recognized as a common complication in critically ill patients. Risk factors including critical illness, mechanical ventilation, sedative medications,

and central venous catheter insertion are major contributing factors to the high risk of VTE⁽¹⁾.

VTE is a common lethal disease that affects hospitalized patients, recurs frequently, is often overlooked, and can result in long term complications, including chronic thromboembolic pulmonary hypertension and post thrombotic syndrome. Although it is the 3rd most common cause of hospital-related deaths, less than half of all hospitalized patients at risk for VTE, received adequate prophylactic treatment. Most of hospitalized patients have at least one or more risk factors for VTE, and without prophylaxis, the incidence of hospital acquired DVT is 10% to 20% among medical patients and even higher among surgical patients (15% to 40%)⁽⁴⁾

Patients and Methods:

The study included 143 consecutive patients who admitted to ICU for non cardiac emergencies. The study was approved by the Ethics Board of Al-Azhar University.

All patients admitted to ICU, from November 2015 to november 2016 were included in the study, 319 patients were admitted to ICU during this time with medical emergency, surgical emergency or for post-operative observation, 167 patients were

excluded from the study. The remaining 143 patients were enrolled in the study as they were admitted due to non-cardiac etiology.

Exclusion criteria:

All patients admitted due to cardiac emergencies such as cardiogenic shock ,acute coronary syndrome ,symptomatic bradycardia or tachycardia, Heart failure , acute pulmonary edema , Cardiac temponade, acute pulmonary embolism , duration of stay in ICU less than 3 days and Patient with chronic AF.

The remaining 143 patients fulfilled the following inclusion criteria were included with emphasis on duration of stay in ICU to be at least 3 days or more.

Inclusion criteria:

The study included all 143 patients admitted to ICU due to medical causes as cerebro-vascular accidents, chest problems and respiratory failure, endocrinal or metabolic abnormalities, acute renal failure or chronic renal failure, liver cell failure, or surgical causes as road traffic accidents, multiple traumas, acute pancreatitis, acute cholecystitis and other acute abdomen emergencies and Postoperative causes as after neurosurgical operations e.g. excision of brain tumor and after orthopedic operations e.g. total hip replacement surgery.

Clinical assessment of all patients, age, gender, body weight , height m body mass index, heart rate ,temperature, respiratory rate , duration of stay. Risk factors as Diabetes mellitus which was defined as fasting plasma glucose ≥ 126 mg/dl and/or random plasma glucose ≥ 200 mg/dl and/or using of glucose

lowering medication. Duration and type of medication (oral hypoglycemic drugs, Insulin or combination of both) were also noted. Hypertension defined as blood pressure BP $>140/90$, and/or use of BP lowering medication. Dyslipidemia defined as total cholesterol >200 mg/dL, LDL cholesterol >100 mg/dL, use of lipid lowering medication or hypertiglyceremia defined as TAGs > 150 mg /dL. Smokers were defined as those who currently smoking or had quit within the last 5 years.

Laboratory work up to all patients, including complete blood count , fasting lipid profile (total cholesterol, LDL, and TGs), sodium, Potassium, Magnesium and Calcium levels in blood International normalization ratio, arterial blood gases, liver function tests (AST – ALT) and Kidney function tests (blood urea & Creatinine).

Echocardiography was done to all patients ,two-dimensional, M-mode and Doppler echocardiographic studies using a 2.5 MHz transducer of the commercially available machine within 2-3 days after ICU admission.

Statistical Analysis:

Data were collected, revised, coded and entered to the Statistical Package for Social Science (IBM SPSS) version 20. The qualitative data were presented as number and percentages while quantitative data were presented as mean, standard deviations and ranges when their distribution found parametric and were presented as median with interquartile ranges (IQR) when their distribution found non-parametric.

Result:

Table (1): Demographic data and risk factors of the whole studied population.

		No.= 143
Age	Mean \pm SD	60. 76 \pm 16. 73
Sex	Female	77 (53.8%)
	Male	66 (46.2%)
Hypertension	Yes	79 (55.2%)
DM	Yes	82 (57.3%)
Smoking	Yes	58 (40.6%)
Heart failure	Yes	42 (29.4%)

Table (2): Shows the causes of admission to ICU among the studied population.

Cause of admission to ICU	No	%
Medical emergency	128	89.6
Chest infection	41	28.7
Stroke	24	16.8
Diabetic ketoacidosis	20	14
Intra-cerebral hemorrhage	13	9.1
Septic shock	8	5.6
Respiratory failure type 2	7	5.4
Brain tumor	4	2.8
Bronchial Asthma	3	2.1
Meningitis	2	1.4
Disturbed Level of Consciousness	2	1.4
Post-arrest	2	1.4
Status Epileptics	1	0.7
Cancer stomach	1	0.7
Surgical emergency	15	10.4
Fracture femur	5	3.5
Fracture pelvis	4	2.8
Postoperative peritonitis	2	1.4
Gun shot	3	2.1
Road traffic accident	1	0.7

Table (3): Shows different vital signs, Weight in Kg, height in cm, body mass index and duration of stay in ICU of the studied population.

Vital Signs		No.= 143
Heart Rate	Mean ± SD	100.66 ±19.25
Systolic BP	Mean ± SD	127.90 ±26.82
Diastolic BP	Mean ± SD	77.66 ±14.97
Temperature (°C)	Mean ± SD	38.06 ±0.59
Respiratory Rate	Mean ± SD	24.30 ± 4.37
Weight (Kg)	Mean ± SD	90.27±18.19
Height (Cm)	Mean ± SD	167.71 ±5.91
Body Mass Index	Mean ± SD	32.05 ±6.44
Duration of stay in ICU (days)	Mean ± SD	8.21 ±2.91

Table (4): Shows the number of complicated patients, types of complications and fate of all studied population.

		No.	%
Complications	Non complicated	95	66.43%
	Complicated	48	33.5%
Types of complications	Atrial fibrillation	27	56.0%
	Deep venous thrombosis	8	16.6%
	Pulmonary embolism	13	27.08%
Fate	Death	49	34.3%
	Discharge	94	65.7%

Table (5): Shows the laboratory data collected from studied population.

Total leucocytic count (cells/ul)	Mean ± SD	15292.38 ± 514.56
Hb (mg/dl)	Mean ± SD	10.02 ± 2.33
Platelets (K/ul)	Mean ± SD	220.10 ± 40.0
Urea (mg/dl)	Median	50 (37-49)
Creatinine (mg/dl)	Median	1 (0.9-1.1)
AST (U/L)	Median	32(25-36)
ALT (U/L)	Median	39(30-37)
PH	Mean ± SD	7.32 ± 0.13
Pco2	Mean ± SD	39.33 ± 3.21
HCO3 (mmol/L)	Mean ± SD	19.47 ± 5.62
Na (mEq/L)	Mean ± SD	133.35 ± 7.53
K (mEq/L)	Mean ± SD	3.97 ± 1.00
Mg (mEq/L)	Mean ± SD	2.04 ± 0.57
Ca (mEq/L)	Mean ± SD	9.38 ± 0.50
T. cholesterol (mg/dl)	Mean ± SD	209.61 ± 23.98
.DL (mg/dl)	Mean ± SD	140.31 ± 27.12
Triglyceride (mg/dl)	Median (IQR)	180 (155-211)
INR	Mean ± SD	1.27 ± 0.48

Table (6): Shows Electrocardiogram data.

ECG		No.= 143
Rate	Mean ± SD	100.91 ± 20.66
Rhythm	Irregular	27 (18.8%)
	Regular	116 (81.2%)
Ischemia	No	103 (72.0%)
	Yes	40 (28.0%)

Table (7): Shows the Echocardiographic findings in the study population.

ECHO findings		No.= 143
Aortic root (cm)	Mean ± SD	2.48 ±0.28
left atrium (cm)	Mean ± SD	3.76 ± 0.48
EF%	Mean ± SD	56.53 ± 8.68
RWMA	No Yes	99 (69.2%) 44 (30.8%)
Diastolic dysfunction	Grade 1	73(51.0%)
	Grade 2	36(25.1%)
	Normal	34 (23.7%)
Mitral valve	Mild MR	68 (47.6%)
	Moderate MR	13 (9.1%)
	Normal	44 (30.8%)
	Trivial MR	18 (12.6%)
Aortic valve	Calcific	19 (13.3%)
	Mild AR	3 (2.1%)
	Moderate AR	5 (3.5%)
	Normal Trivial AR	113 (79.0%)
Pulmonary valve	Mild PR	2 (1.4%)
	Normal	141 (98.6%)
Right Ventricle	Dilated	22(15.4%)
	Normal	121 (84.6%)
Tricuspid valve	Mild TR	24(16.8%)
	Moderate TR	9 (6.3%)
	Normal	73 (51.0%)
	Severe TR	3(2.1%)
	Trivial TR	34 (23.8%)
Pulmonary artery Pressure (mmhg)	Mean ± SD	31.34 ±11.29

Table (8): Relation between complication and demographic data and risk factors of the studied patients.

		Non complicated	Complicated	Chi-square test	
		No. = 95	No.= 48	X ² /t*	P-value
Age	Mean ± SD	58.37 ± 18.06	64.69 ±13.55	-22.13*	0.028
Sex	Female	49 (51.5%)	28 (58.33%)	2.902	0.08
	Male	46 (51.7%)	20 (37.0%)		
HTN	Yes	49 (55.1%)	30 (55.6%)	0.003	0.954
DM	Yes	42 (47.2%)	40 (74.1%)	9.930	0.002
Smoking	Yes	40 (44.9%)	13 (33.3%)	1.879	0.170
Heart disease	Yes	28 (31.5%)	14 (25.9%)	0.496	0.481

Table (9): Shows the Relation between complication and causes of ICU admission of the studied population.

Cause of ICU admission	Non complicated		Complicated		Chi-square test	
	No.	%	No.	%	X2	P-value
Brain tumor	2	2.2%	2	3.7%	0.262	0.608
Bronchial asthma	3	3.4%	0	0.0%	1.859	0.173
Cancer stomach	1	1.1%	0	0.0%	0.611	0.434
Chest infection	25	28.1%	10	20.8%	0.039	0.843
Diabetic ketoacidosis	15	16.9%	5	9.3%	1.611	0.204
fracture pelvis	0	0.0%	4	7.4%	6.782	0.009
fracture femur	0	0.0%	5	9.3%	8.539	0.003
gun shot	3	3.3%	0	0.0%	1.231	0.257
Intracerebral hemorrhage	11	12.4%	2	3.7%	3.047	0.081
Meningitis	2	2.2%	0	0.0%	1.231	0.267
Post arrest	2	2.2%	0	0.0%	1.231	0.267
postoperative peritonitis	2	2.2%	0	0.0%	1.231	0.267
Respiratory failure type 2	7	12.9%	1	1.9%	3.800	0.051
road traffic accident	7	12.9%	0	0.0%	0.611	0.434
Septic shock	5	5.6%	3	5.6%	0.000	1.000
Status epileptics	1	1.1%	0	0.0%	0.611	0.434
Stroke	8	9.0%	16	29.6%	10.252	0.001

Table (10): Relation between complication and (vital signs, anthropometric measures, duration of stay in ICU and fate) of the studied patients.

		Non complicated	Complicated	Independent t-test	
		No.= 95	No.= 48	t/X ² *	P-value
Heart rate	Mean ± SD	99.33 ±20.33	102.87 ± 17.30	-1.068	0.287
Systolic BP	Mean ± SD	131.24±24.72	122.41 ±29.39	1.926	0.056
Temperature (°C)	Mean ±SD	38.09 ±0.64	38.00 ± 0.49 37	0.833	0.406
Respiratory rate	Mean ± SD	23.34 ±4. 03	25.89 ± 4.48	-3.521	0.001
Weight (kg)	Mean ± SD	86.40±16.15	96.63 ± 19.68	-3.376	0.001
Height (cm)	Mean ± SD	150- 185	165.35 ±4.60	3.906	0.000
BMI (kg/m2)	Mean ±SD	30.00 ±4. 67	35.44 ± 7.49 23-	-5.360	0.000
Duration of stay n ICU (days)	Mean ± SD	8.31 ±3.12	8.04 ± 2.54	0.552	0.582
Fate	Death Discharge	21 (23.6%) 68 (76.4%)	28 (51.9%) 26 (48.1%)	11.913	0.001

Table (11): Relation between complications and laboratory data of the study groups.

laboratory data		Non complicated No.= 95	Complicated No.= 48	Independent t-test	
				t/Z*	P-value
TLC (cells/ul)	Mean ± SD	14258.43 ± 668.53	16996.49 ±456.55	-2.480	0.014
Hb (mg/dl)	Mean ± SD	10.46 ±2.45	9.30 ± 2.07	2.904	0.004
Platelets (k/ul)	Mean ± SD	223.48 ± 39.88	214.52 ±40.80	0.648	0.518
Urea (mg/dl)	Median	51 (36 - 40)	47.5(39-50)	-0.058*	0.953
creatinine(mg/dl)	Median	1 (0.8-1.0)	1.1 (0.9-1.1)	-1.730*	0.084
AST (U/L)	Median	29 (23 - 30)	37(29-34)	-2.054*	0.040
ALT (U/L)	Median	37 (26 - 33)	40.5(33-43)	-1.829*	0.067
PH	Mean ± SD	7.33 ±0.12	7.31 ±0.15	1.002	0.318
Pco2	Mean ± SD	40.89 ±3.01	36.76 ±3.27	1.826	0.070
HCO3 (mmol/L)	Mean ± SD	19.76 ± 5.56	19.00 ±5.75	0.783	0.435
Na (mEq/L)	Mean ± SD	133. 58 ±6.53	134. 30 ±8.99	-0.547	0.585
K(mEq/L)	Mean ± SD	4.01 ± 1.02	3.89 ± 0.98	0.723	0.471
Mg (mEq/L)	Mean ± SD	2.14 ±0.42	1.87 ±0.41	2.837	0.005
Ca (mEq/L)	Mean ± SD	9.39 ±0.21	9.37 ± 0.49	0.263	0.793
F. cholesterol (mg/dl)	Mean ± SD	205.66 ±21. 59	216. 11 ±26.41	-2.576	0.011
LDL (mg/dl)	Mean ± SD	139.20 ±28.29	142. 13 ±25.24	-0.624	0.533
Triglyceride (mg/dl)	Median	180 (155-200)	180.5 (160-200)	-0.856*	0.392
INR	Mean ± SD	1.26 ±0.16	1.28 ±0.14	-0.213	0.831

Table (12): Relation between complications and ECG findings of the study groups.

		Non complicated No.= 95	Complicated No.= 48	Chi-square test	
				X ² /t*	P-value
Rate	Mean ± SD	98.20 ± 20.55	105.37 ±20.23	-2.034*	0.044
Rhythm	Irregular	0 (0.0%)	27 (50.0%)	20.736	0.008
	Regular	89(100.0%)	27 (50.0%)		
Ischemia	No	65 (73.0%)	38 (70.4%)	0.118	0.731
	Yes	24 (27.0%)	16(29.6%)		

Table (13): Shows relation between complications and echocardiographic findings in the study groups.

	Non complicated	Complicated	Independent t-test
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Study of Atrial Fibrillation and Venous Thromboembolism....

		No = 95	No.= 48	t/X ² *	P-value
Aortic root (cm)	Mean ± SD	2.48 ± 0.25	2.46 ± 0.34	0.396	0.693
left atrium (cm)	Mean ± 3D	3.70 ± 0.44	3.86 ± 0.53 3.2-	-1.878	0.063
EF (%)	Mean ± 3D	56.09 ± 9.15	57.26 ± 7.88	-0.780	0.437
RWMA	No Yes	59 (66.3%) 30 (33.7%)	40 (74.1%) 14 (25.9%)	0.955*	0.328
Diastolic Dysfunction	Grade 1	53 (59.5%)	20 (54%)	10.938*	0.165
	Grade 2 Normal	15(17%) 21 (23.5%)	21 (38.8%) 13(24%)		
Mitral valve	Mild MR	41 (46.1%)	27 (50.0%)	8.197*	0.042
	Moderate MR	6 (6.7%)	7(13.0%)		
	Normal Trivial MR	34 (38.2%)	10(18.5%)		
	MR	8 (9.0%)	10(18.5%)		
Aortic valve	Calcific	14(15.7%)	5 (9.3%)	7.098	0.131
	Mild AR	0 (0.0%)	3 (5.6%)		
	Moderate AR	3 (3.4%)	2 (3.7%)		
	Normal Trivial AR	71 (79.8%)	42 (77.8%)		
	AR	1 (1.1%)	2 (3.7%)		
Pulmonary valve	Mild PR	2 (2.2%)	0 (0.0%)	1.231*	0.267
	Normal	87 (97.8%)	54(100.0%)		
Right Ventricle	Dilated	12(13.5%)	10 (18.5%)	0.655*	0.418
	Normal	77 (86.5%)	44 (81.5%)		
Tricuspid valve	Normal	45 (50.6%)	15(27.7%)	11.632*	0.020
	Mild TR	14(15.7%)	11 (20.3%)		
	Moderate TR	2 (2.2%)	8 (14.8%)		
	Severe TR	1 (1.1%)	3 (5.5%)		
	Trivial TR	27 (30.3%)	17 (31.4%)		
Pa Pr (mmhg)	Mean ± SD	29.83 ± 9.87	33.81 ± 13.03	-2.069	0.040

Table (14): Relation between the three major complications (AF, PE and DVT) and Age, DM, RR and anthropometric measures

Type of complications		AF	Pulmonary embolism	DVT	One Way ANOVA	
		No.= 27	No.= 13	No.= 8	F/X ² *	P-value
Age (yrs)	Mean ± SD	61.77 ± 7.92	68.74 ± 14.61	64.25 ± 6.88	1.558	0.222
DM	No	3 (23.1%)	9 (33.3%)	1 (12.5%)	1.501*	0.472
	Yes	10 (76.9%)	18(66.7%)	7 (87.5%)		
RR (train)	Mean ± SD	27.31 ± 3.20	25.22 ± 5.03 18-	24.38 ± 3.62	1.386	0.261
Weight (kg)	Mean ± SD	109.85 ± 20.75	87.78 ± 15.26	113.75 ± 14.48	11.761	0.000
Height (cm)	Mean ± SD	165.31 ± 2.98	165.63 ± 5.46	166.00 ± 4.24	0.054	0.948
BMI (kg/m ²)	Mean ± SD	40.82 ± 7.49	32.05 ± 5.86 23-	41.15 ± 6.84	11.110	0.000

Table (14) continues:

Type of complications		AF	DVT	Pulmonary embolism	Chi-squares test	
		No.= 27	No.= 8	No. = 13	X ² /F*/K•	P-value
Fate	Death	18 (66.7%)	3 (37.5%)	6 (46.2%)	2.872	0.238
	Discharge	9 (33.3%)	5 (62.5%)	7 (53.8%)		
FLC (cells/ill)	Mean ± SD	16089.27 ±8330.56	19912.50 ±3570.69	17492.31 ±8712.30	0.745*	0.480
Hb (mg/dl)	Mean ± SD	10.08 ±2.04	7.68 ± 0.92	8.38 ±1.70	7.266*	0.002
AST (U/L)	Median	40 (31 - 40)	31.5(30-40.5)	30 (28 - 30)	2.469*	0.291
ALT (U/L)	Median	44 (30 - 50)	40(37.5-47.5)	36(30-50)	0.293*	0.864
Mg (mEq/L)	Mean ± SD	1.94± 0.31	1.79 ±0.34	1.97 ±0.31	0.237*	0.790
Total cholesterol (mg/dl)	Mean ± SD	212.30 ±24.62	222.50 ± 18.03	227.31 ±20.16	2.128*	0.131

Table (15): Relation between three major complications (AF,PE & DVT) and Fate, TLC, Hb, AST, ALT, Mg, T. cholesterol

	Univariate regression analysis					Multivariate regression analysis	
	B	S.E.	Wald	P-value	Odds ratio (OR) [95% CI]	P-value	Odds ratio (OR) [95% CI]
Age	0.024	0.011	4.641	0.031	1.025(1.002-1.048)	0.238	1.037(0.976-1.101)
DM	1.162	0.376	9.546	0.002	3.197(1.530-6.683)	0.318	0.473(0.109-2.056)
RR	0.140	0.043	10.735	0.001	1.150(1.058-1.251)	0.001	1.528(1.196-1.951)
WT	0.033	0.010	9.838	0.002	1.033(1.012-1.055)	0.704	0.979(0.880-1.090)
Height	-0.122	0.034	12.646	0.001	0.885(0.828-0.947)	0.058	0.862(0.740-1.005)
BM1	0.155	0.035	19.383	0.001	1.167(1.090-1.250)	0.018	1.423(1.061 -1.907)
TLC	0.001	0.001	5.481	0.019	1.000(1.000-1.000)	0.075	1.000(1.000-1.000)
HB	-0.223	0.081	7.682	0.006	0.800 (0.683 - 0.937)	0.689	0.941 (0.700-1.266)
AST	0.002	0.002	0.742	0.389	1.002(0.998-1.005)		
ALT	0.003	0.002	1.626	0.202	1.003(0.998-1.008)		
Mg	-0.904	0.332	7.409	0.006	0.405(0.211 -0.776)	0.000	0.043(0.008-0.223)
T.cholesterol	0.020	0.008	6.140	0.013	1.020(1.004-0.036)	0.544	0.991 (0.962-1.021)

Discussion:

There was statistically significant difference regarding age. The range of age of the study group was from 17 to 93 years, the mean age in complicated group was around 64.69 years old, compared with mean of 58.37 years in non-complicated group. This is consistent with *Guenancia et al.* ⁽⁵⁾.

There was no statistically significant difference regarding sex. However, the number of females with complications was higher than number of males. This is consistent with Fuster study ⁽³⁾. There was no statistically significant difference regarding smoking. There was no statistically significant difference regarding hypertension. However the number of hypertensive patients with complications was higher than normotensive patients. There was statistically significant difference regarding Diabetes Mellitus. However the number of diabetic patients with complications was 40 patients (74.1% of cases) and the number of non-diabetic patients with complications were 14 patients (25.9% of cases). This is consistent with **Rosenberg** study ⁽⁶⁾. There was no statistically significant difference regarding heart failure. As regard causes of admission to ICU there was statistically significant difference regarding Cerebro-Vascular Stroke, however the number of patients of cerebro-Vascular Stroke with complications was 16 patients (29.6% of all complicated patients). This is consistent with Slipman study ⁽⁷⁾. There was statistically significant difference regarding fracture pelvis, patients admitted due to fracture pelvis were 4 patients, all of them had cardiac complications. This is consistent with Pedro study ⁽⁸⁾.

There was statistically significant difference regarding fracture femur. This is consistent with Kim study ⁽⁴⁾. There was no statistically significant difference regarding chest infection (<P-value 0.05). There was statistically significant difference regarding weight. This is consistent with Stein study ⁽⁹⁾.

There was statistically significant difference regarding BMI. In the complicated group the range of BMI was from 23 to 50 kg/m² with mean around 35.4 kg/m², compared with range of 18 to 46 kg/m² in the non-complicated group with mean around 30 kg/m². This is consistent with Stein et al ⁽⁹⁾.

There was a statistically significant relation found between complications and respiratory rate with. This is consistent with Torbicki Astein et al ⁽¹⁰⁾. There was

statistically significant difference regarding fate of the patients in the study population. In the complicated group the number of deaths was 28 patients and in non-complicated group the number of deaths was only 21 patients. There was statistically significant difference regarding TLC. The mean range of TLC in complicated group was 17.000 cells/ul. There was statistically significant difference regarding hemoglobin level. However patients with complications their Hb level was less than 10mg/dl. This is consistent with Jiménez D et al ⁽¹¹⁾. There was statistically significant relation found between complicated patients and AST level, total cholesterol and heart rate. There was statistically significant difference regarding mitral valve. There was a statistically significant relation between complicated patients and pulmonary artery pressure. There was statistically significant relation found between body weight and the incidence of DVT. The weight in kg in patients complicated with DVT was 113 kg, while the mean body weight in non-complicated group was 86 kg. Venous thromboembolism risk factors are more specific to critically ill patient; age, immobilization, obesity, past history of personal or familial VTE, and past history of neoplasm ⁽²⁾.

There was a significantly important relation between the DVT and increased BMI, however the body mass index in DVT complicated group was 41.1 kg/m² (class 3 obesity). There was a significantly important relation between the hemoglobin level and the incidence of DVT. However the hemoglobin level in DVT group was 7.6 mg/dl ⁽¹¹⁾.

Conclusion

The study concluded that, the ICU patients have a higher risk than other patients for adverse cardiac complications like AF, DVT and pulmonary embolism. Cardiac complications lead to increased rate of mortality and morbidity.

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