RESULTS

1-Study population:

Between March 2009 and July 2009, 100 consecutive patients were included in a single arm study to evaluate the incidence and clinical predictors of HIT. Mean age was 47 ± 22 years (range: 1-83). Fifty percent were males, 16 patients have diabetes mellitus, 11 patients have hypertension, 14 patients have chronic renal failure; 10 of them on regular haemodialysis, 5 patients were smokers, 5 patients have respiratory diseases; 4 patients have COPD and 1 patient have bronchial asthma, 4 patients have cerebrovascular insufficiency, 2 patients have morbid obesity and 1 patient received oral contraceptive pills.

Heparin was indicated in fifty (50%) due to medical background (DVT, PE, ACS, etc); Ten patients (10%) were pregnant and ten patients (10%) were children. In thirty patients (30%) heparin was indicated as a prophylaxis against thromboembolic complications after non cardiac surgery. Twenty patients (20%) received heparin during and after cardiac surgery. Fifty patients (50%) received unfractionated heparin (UFH) and fifty patients (50%) received low molecular weight heparin (LMWH), sixty one patients (61%) received heparin for the first time and thirty nine patients (39%) previously exposed to heparin table (13).

Heparin was given in variable doses ranged from small prophylactic doses and heparin flushes to large therapeutic doses and by different routes (S.C, I.V bolus or infusion).

Table (13): Demographic and baseline characteristics:

Variables		Number	Percent
Age	M	47	-
	SD	22	-
Sex	Male	50	50%
	Female	50	50%
Type of treatment	Medical	50	50%
	Non cardiac surgery	30	30%
	Cardiac surgery	20	20%
Type of heparin	LMWH	50	50%
	UFH	50	50%
Previous exposure to heparin	Yes	39	39%
	No	61	61%
Different co-morbidities	Diabetes mellitus	16	16%
	Hypertension	11	11%
	Chronic renal failure	14	14%
	Respiratory diseases	5	5%
	Smoking	5	5%
	Pregnant patients	10	10%
	Pediatrics	10	10%

M: mean, SD: standard deviation.

2-Platelet count:

Table (14): HIT according to platelet count:

Platelet count by day	Final result	N	M	SD	t	p
Day 0	Group I (-VE)	94	260.33	93.299	1.6	>0.05
	Group II (+VE)	6	224.67	49.103		
Day 2	Group I (-VE)	94	246.70	88.654	2.2	<0.05
	Group II (+VE)	6	165.67	59.547		
Day 4	Group I (-VE)	94	243.12	88.256	2.3	<0.05
	Group II (+VE)	6	161.17	40.543		
Day 6	Group I (-VE)	94	241.32	89.045	2.7	<0.05
	Group II (+VE)	6	141.17	56.001		
Day 8	Group I (-VE)	94	241.89	89.264	3.1	<0.05
	Group II (+VE)	6	129.00	65.263		
Day 10	Group I (-VE)	94	244.77	88.538	2.8	<0.05
	Group II (+VE)	6	143.00	57.515		
Day 12	Group I (-VE)	94	246.27	88.264	2.7	<0.05
	Group II (+VE)	6	149.17	56.757		
Day 14	Group I (-VE)	94	245.88	88.848	2.3	<0.05
	Group II (+VE)	6	161.17	52.632		

- **N: number, M: mean, SD: standard deviation**
- **P > 0.05 = No statistical significance.**
- **P < 0.05 = statistical significance.**
- **P < 0.001 = High statistical significance.**
- **Group I (-VE): Patients who didn't develop HIT.**
- **Group II (+ve): Patients who developed HIT.**

Table (15): Platelet count at baseline and follow up:

Platelet count by day	Group I (Number)	Group II (Number)
Day 0	260 ± 93	225 ± 49
Day 2	247 ± 89	165 ± 60[(1)]
Day 4	243 ± 88	161 ± 40[(1,2)]
Day 6	241 ± 89	141 ± 56[(1,2)]
Day 8	242 ± 89	129 ± 65[(1,2)]
Day 10	245 ± 89	143 ± 58[(1,2)]
Day 12	246 ± 88	149 ± 57[(1,2)]
Day 14	246 ± 89	161 ± 53[(1)]

- (1): P value < 0.05 between groups.
- (2): P value < 0.05 within groups.

Tables (14, 15) show platelet count at base line and follow up in those who did not developed (group I) or developed (group II) HIT. In group I the mean platelet count at baseline (day 0) was 260 ± 93 and during follow up the mean platelet counts were 247 ± 89, 243 ± 88, 241 ± 89, 242 ± 89, 245 ± 89, 246 ± 88 and 246 ± 89 from day 2 to day 14. In group II the mean platelet count at base line (day 0) was 225 ± 49 and during follow up the mean platelet counts were 165 ± 60, 161 ± 40, 141 ± 56, 129 ± 65, 143 ± 57, 149 ± 56 and 161 ± 52 from day 2 to day 14.

Between groups analysis showed no significant difference in platelet count at baseline but there was significant decrease in platelet count in group II from day 2 to day 14 compared to group I.

Within group analysis showed no differences from baseline to day 14 in group I but significant decrease from baseline to day 14 in group II.

3-Characteristics and clinical predictors of HIT:

According to clinical diagnosis based on the 4T score system 6 patients (6 %) developed HIT. Mean age was 64 ± 6 years, 3 patients (50%) were males and 3 patients were females (50%); non of them were pregnant (0 %), 5 patients (83%) underwent surgical treatment; 2 of them (33%) underwent cardiac surgery and 1 patient(17%) underwent medical treatment, 4 patients (66%) received UFH and 2 patients (33%) received LMWH, 5 patients (82%) received heparin for the first time and 1 patient (18%) was previously exposed to heparin, 4 patients had intermediate clinical probability (66%), 1 patient (17%) has low clinical probability and 1 patient (17%) has high clinical probability. Three patients (50%) developed venous thrombosis (DVT with subsequent PE), 1 patient (17%) developed arterial thrombosis (middle cerebral artery) and 2 patients (33%) had no thrombotic events, Tables (16-24).

The mean time of HIT occurrence was day 8. HIT was developed on 2^{nd} day of treatment with heparin in 1 patient, 6^{th} day in 1 patient while in 8^{th} in 4 patients.

In 4 patients heparin was stopped and a direct thrombin inhibitor (recombinant hirudin) was added by i.v infusion for 5 days as a standard treatment and in 2 patients only heparin was stopped.

Predictors of HIT were: surgical patients (OR: 5.4, P value < 0.05), unfractionated heparin (OR: 2.1, P value > 0.05) and first exposure to heparin (OR ratio: 3.4, P value < 0.05).

Table (16): HIT according to age:

Age	N	M	SD	t	P
Group I (-ve)	94	45.66	22.091	1.9	>0.05
Group II (+ve)	6	62.83	5.707		

-N: number, M: mean, SD: standard deviation.

Table (17): HIT according to sex:

Sex	Male	Female	Total
Group I (-ve)	47	47	94
Group II (+ve)	3	3	6
Total	50	50	100

Table (18): HIT according to type of treatment:

Type of treatment	Medical	Surgical	Total	X^2	p
Group I (-ve)	49	45	94	1.6	>0.05
Group II (+ve)	1	5	6		
Total	50	50	100		

Table (19): HIT according to type of heparin:

Type of heparin	LMWH	UFH	Total	X^2	p
Group I (-ve)	48	46	94	0.8	>0.05
Group II (+ve)	2	4	6		
Total	50	50	100		

Table (20): HIT according to previous exposure to heparin:

Previous exposure	No	Yes	Total	X^2	P
Group I (-ve)	56	38	94	1.3	>0.05
Group II (+ve)	5	1	6		
Total	61	39	100		

Table (21): HIT in pregnant and non pregnant females.

Pregnancy	Non pregnant	Pregnant	Total	X^2	P
Group I (-ve)	37	10	47	0.02	>0.05
Group II (+ve)	3	0	3		
Total	40	10	50		

Table (22): HIT according to Site of thrombosis:

Site of thrombosis	No	Venous	Arterial	Total	X^2	P
Group I (-ve)	94	0	0	94	65.2	<0.001
Group II (+ve)	2	3	1	6		
Total	96	3	1	100		

Table (23): clinical probability of HIT:

clinical probability	Number	Percent
NAD	94	94 %
Low	1	1 %
Intermediate	4	4 %
High	1	1 %
Total	100	100 %

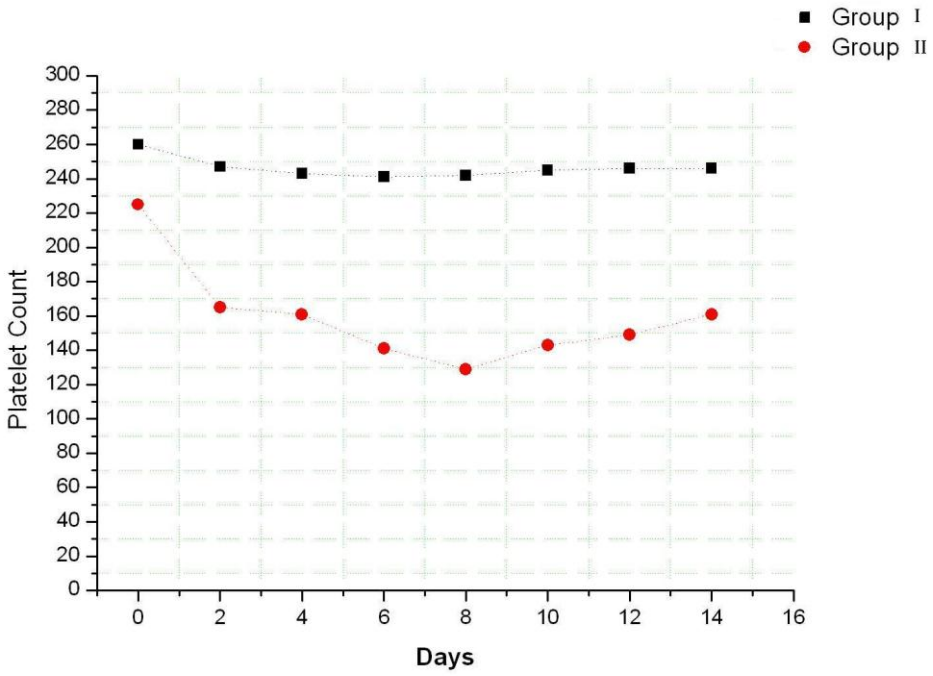
Table (24): Predictors of HIT:

Variables		Number	Percent	P value	OR
Sex	Male	3	50 %	—	1
	Female	3	50 %		
Type of heparin	UFH	4	66.5 %	>0.05	2.1
	LMWH	2	33.5 %		
Type of treatment	Medical	5	82 %	>0.05	5.1
	Surgical	1	18 %		
Previous exposure	Yes	1	18 %	>0.05	3.4
	No	5	82 %		

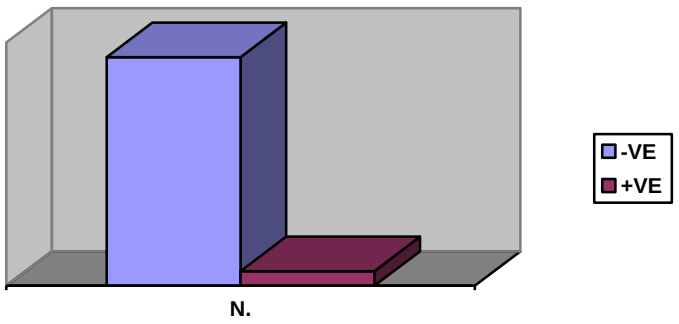
4-Adverse events:

No mortality was reported in patients who did not develop HIT. Among patients who developed HIT, three of them (50%) died in-hospital; one due to cerebral infarction and two due to pulmonary embolism.

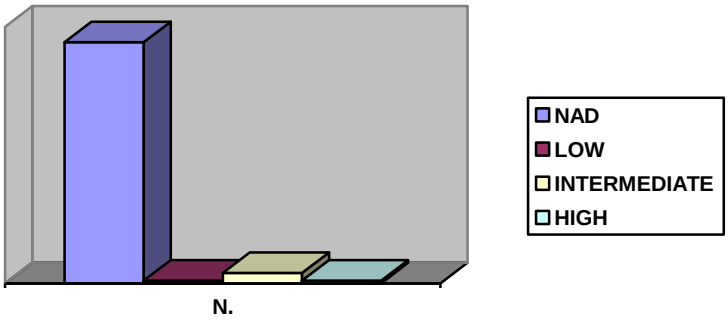
Graph (1): HIT according to platelet count:



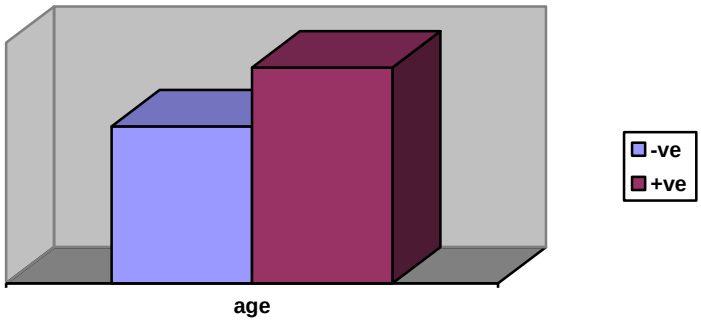
Graph (2): study group according to final results:



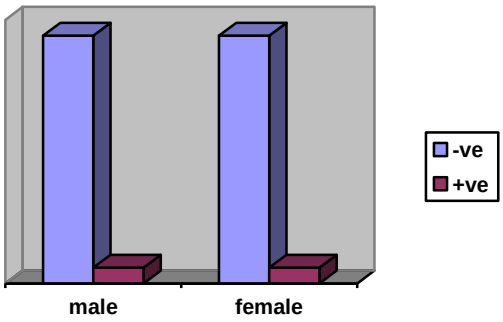
Graph (3): Clinical probability of HIT:



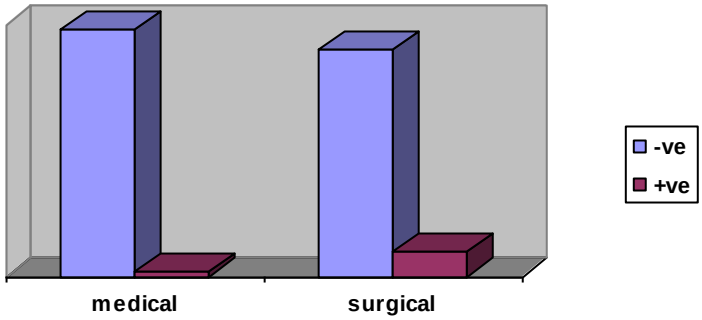
Graph (4): HIT according to age:



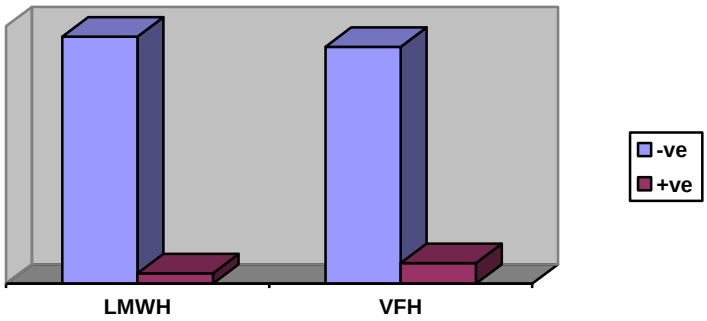
Graph (5): HIT according to sex:



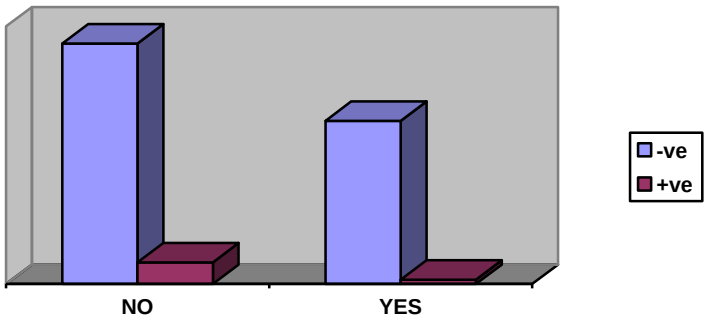
Graph (6): HIT according to type of treatment:



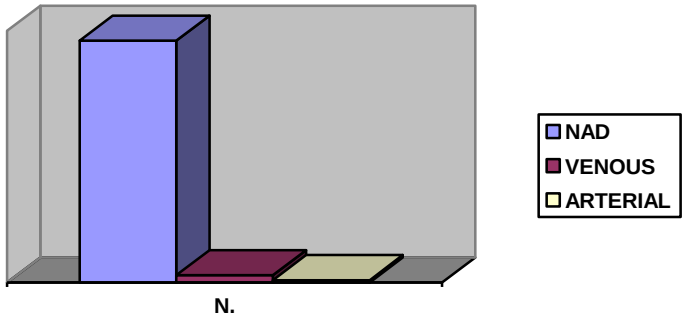
Graph (7): HIT according to type of heparin:



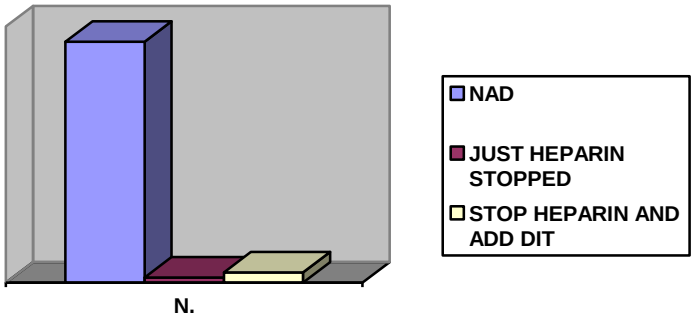
Graph (8): HIT according to previous exposure to heparin:



Graph (9): HIT according to site of thrombosis:



Graph (10): Treatment of HIT:



Graph (11): Outcome of HIT: