# Results

Thirty patients, fifteen males (50 %) and fifteen females (50 %), their ages ranged from (38years) to (58years), mean age (43.6 years) and mean ± S D43.6 ± 5.2 presented with symptoms and signs of acute deep venous thrombosis, in the form of pain of the affected limb in (fifteen ) cases, swelling of the affected limb in (ten)cases , both pain and swelling in another (five) cases, and positive Homan's sign in (ten ) cases as show in ***table (1)Graph (A)***

. In our study only (one) case with extensive femropopliteal vein thrombosis had developed pulmonary embolism early during her acute illness, as evidenced by clinical manifestation (chest pain, dyspnea, tachypnea, and confirmed later by Lung Perfusion Scan to have a pulmonary embolism . After good history, clinical examination, and analysis of any associated risk factors ,all studied patients were categorized into three groups according ***to Wells et al (1995)*** clinical pretest probability tool that mentioned before in table (A) ,as follow: (1)- (six) patients with low clinical probability which represent (20 %)of all studied patients, (2)- (eighteen ) patients with medium clinical probability which represent (60%) of all studied patients (3)- (six )patients with high clinical probability group that represent (20 %), of all studied patients ***table (1)Graph (A).***

The relationship between clinical probability of studied patients and Contrast Venography ( gold standard) has shown that only(one) case among (six) cases of low clinical probability had a popliteal D V T which represent (4.5 %)of all positive cases , (fifteen)cases among the

(eighteen) cases of medium clinical probability had D V T(eight cases had a popliteal deep vein thrombosis in addition to seven cases had a femoral vein thrombosis ) that represent (68.2%)of all positive cases as confirmed by C V , and the all (six) cases with high clinical probability had D V T (four cases had femoropopliteal vein thrombosis plus two cases had femoral vein thrombosis) which represent (27 .3 %) of all positive cases as evidenced by C V . In our study we also found that a considerable number, (five)cases among the (six) cases of low clinical probability group had ***no*** D V T which represent (62.5%)of all eight negative cases as confirmed by C V, but only (three cases among the eighteen cases) with medium clinical probability had ***no*** D V T which represent( 37 .5 %) of all negative cases and ***no*** negative cases for D V T have been detected in the all (six ) cases of high clinical probability group ***table (2) Graph(B***)

In our study the relationship between the sites of deep vein thrombosis and clinical probability has revealed that among the (six) cases of low clinical probability only (one) case had a popliteal D V T ,among the (fifteen) cases of medium clinical probability that had D V T, (eight cases had a popliteal D V T plus seven cases had a femoral D V T) and all (six) cases of high clinical probability had D V T distributed as follow (four cases had a femropopliteal D V T plus two cases had a femoral D V T) with a conclusion that, the (four) cases with femropopliteal D V T had a high clinical probability , the (nine) cases of femoral vein thrombosis included (two) cases with high probability plus (seven )cases with medium clinical probability, and among the (nine ) cases of popliteal D V T ,only (one) case had a low clinical probability and the

remaining eight cases had a medium clinical probability as shown in ***table (3) (Graph C)***

All studied patients underwent the following ***laboratory investigation:***

***1- D DIMER TEST*** which was positive in (twenty three) cases and negative in the remaining seven cases of our studied patients .These positive D –dimer cases had the following distribution according to their clinical probability : only (one ) case among the six cases of low clinical probability had a positive D –Dimer test which represent( 4.3 % ) of all positive D –dimer cases , (sixteen) cases had a positive D-dimer test among the (eighteen) cases of medium clinical probability which represent (69.5 %) of all positive D –dimer cases ,and all (six )cases of high clinical probability group had a positive D dimer test which represent ( 26 .2 % ) of all positive D –dimer cases

, In our study the remaining seven cases that had a negative D –dimer test distributed as follow : (five) cases out of (six) cases of low clinical probability group had a negative D dimer test which represent (71.4 % ) of all negative cases , (two) cases of medium clinical probability had a negative D –dimer test which represent (28.6 %) of all negative cases and ***no*** negative D –dimer test was found in all high risk group patients, with a considerable number of low clinical probability group cases that had a negative D dimer test (five cases had a negative D –dimer out of the six cases with a low clinical probability group patients) ***table (4) (Graph D)*** .

Qualitative and Semi quantitative assay was done for all cases with a positive D-dimer test that has shown a level of D –dimer assay ranged between (2 - 4 *ug*/ml) at its lower level and a (64 -128 *ug* /ml)at its higher

level in only one case with femoropopliteal vein thrombosis that had developed pulmonary embolism among the high risk group patients .

In our study , only one case among the (six) cases of low clinical probability group , had a positive D–dimer test with a level at (2 - 4 *ug* /ml), sixteen cases out of the (eighteen) cases of medium clinical probability group were positive for D –dimer test among them two cases had a level at (2 -4 *ug* /ml ) and the other (fourteen )cases had a level that ranged between (4-8 *ug* /ml) up to ( 16- 32 *ug* /ml) ,and the all six cases with high risk probability had a positive D dimer test with a level ranged between (16 -32 *ug* /ml) up to ( 64 128 *ug* /ml )in only one case that developed a pulmonary embolism (***Graph E)***

In our study when the D dimer test compared to Contrast. Venography, it has been found that among the( twenty three) cases with positive D dimer test, (twenty one ) cases had evidence of D V T and the remaining (two ) cases, although they were positive for D –dimer test but had no evidence for D V T as confirmed by C V . It also has been found that among the( seven) cases with negative D dimer test ,only one case had a D V T as confirmed by Contrast Venography yielding a sensitivity of (95.5 %), specificity of (75 %) ,positive predictive value of (91.3 %) and negative predictive value of (85.7 % ***)*** for D- dimer test ***table (5)GraphF***

When positive D - dimer test, ***or*** medium /high clinical probability combined together and compared to Contrast Venography as shown in ***table (6 ) (Graph G)*** , the D- dimer test was found to have a sensitivity of (95.5 %), specificity of (50 %), positive predictive value of (84%) and negative predictive value of (80 %) .

In another combined study of D dimer test ***and*** medium /high clinical probability and compared to Contrast Venography ,the D dimer test was found to have a sensitivity of (95.5 %), specificity(75 %),P P V (91.3 %), and N P P was (85.7%). ***Table (7)( GraphH)*** .

When the D- dimer test ***Or*** Duplex imaging compared to C V (gold standard ) , D-dimer test will have a sensitivity of (100 % ), N P V of (100%) ,specificity of (75%) and the P P V of (91.6%) ***table (8)(Graph I***)

When the D dimer test ***and*** Duplex imaging combined tighter , and compared to C V ,it was found that D dimer test will have a sensitivity of (91.9 % ),specificity of ( 87.5%) P P V of ( 95.5 %) and N P V of (77.7%) .***table (9)*** ( ***Graph J***)

***Thrombophilia screen and other routine laboratory investigations that done for all studied patients were normal apart from one case that had a protein S, deficiency among the high risk probability group.***

***2 - IMAGING STUDY***

***A - CONTRAST VENOGRAPHY***

All studied patients underwent Contrast Venography (C V)which was positive for deep venous thrombosis in twenty two cases that represent (73.3%) of all studied cases ,and it was negative in the remaining eight cases which represent (26.7 % ) .

Our studied patients had the following distribution according to their affected sites that had a D V T as evidenced by Contrast venography ***,(nine )*** cases with femoral vein thrombosis which represent (30 %)of all studied patients with the following clinical probability **(**two

cases with high clinical probability plus seven cases with medium clinical probability) , ***(nine )*** cases had a popliteal vein thrombosis which represent (30 %) of all studied patients with the following clinical probability ( one case with a low clinical probability group plus eight cases of medium clinical probability) and ***(four)*** cases had a femoropopliteal vein thrombosis with a high clinical probability ,which represent (13.3 %) of all studied cases, it was negative in eight cases which represent (26.7%) of all studied cases as shown in ***table (10) (Graph K).***

All positive cases with (C V) had the following clinical probability, (one ) case with a low clinical probability,(fifteen )cases with medium clinical probability and(six ) cases with high clinical probability as shown in ***table (2) Graph (B).,***with a significant association between clinical probability and development of deep vein thrombosis (P<0. 001 and measure of agreement Kappa=1.00).

## *B- COLORED DUPLEX IMAGING:*

All patients included in this study were subjected to colored Duplex imaging, which was positive in twenty two cases which represent (73.3 %) of all studied patients, and it was negative in the remaining eight cases which represent ( 26.7 % ) of all studied cases but their distribution was slightly different from our gold standard (Contrast Venography ).

Our studied patients have been distributed according to the site or segment that had deep vein thrombosis as follow according to their Duplex findings (nine ) cases had a femoral vein thrombosis, which

represent (30 % ) of all studied patients ,(four) cases had femoropopliteal vein thrombosis which represent (13. 3 % ) of all studied patients and (nine )cases had a popliteal vein thrombosis which represent (30 % ) of all studied groups ,and it was negative without Duplex findings for D V T in the remaining (eight ) cases which represent 26.7%of all studied patients.

In our, ***Duplex study*** it has been found that ***no*** evidence for D V T in (eight ) cases ,among them ***one case missed*** by Duplex imaging as had ***no*** D V T , but has been proved and confirmed by Contrast Venography to have a popliteal D V T .It has also been found ***that (one) case*** among the (nine) cases of popliteal vein thrombosis as reported by Duplex imaging ***had no evidence of D V T*** as confirmed by Contrast Venography, and there was complete agreement between findings of Contrast Venography and Duplex imaging in both the ( nine )cases of femoral vein thrombosis cases and the (four ) cases of femoropopliteal vein thrombosis***, table ( 11) (Graph L).***

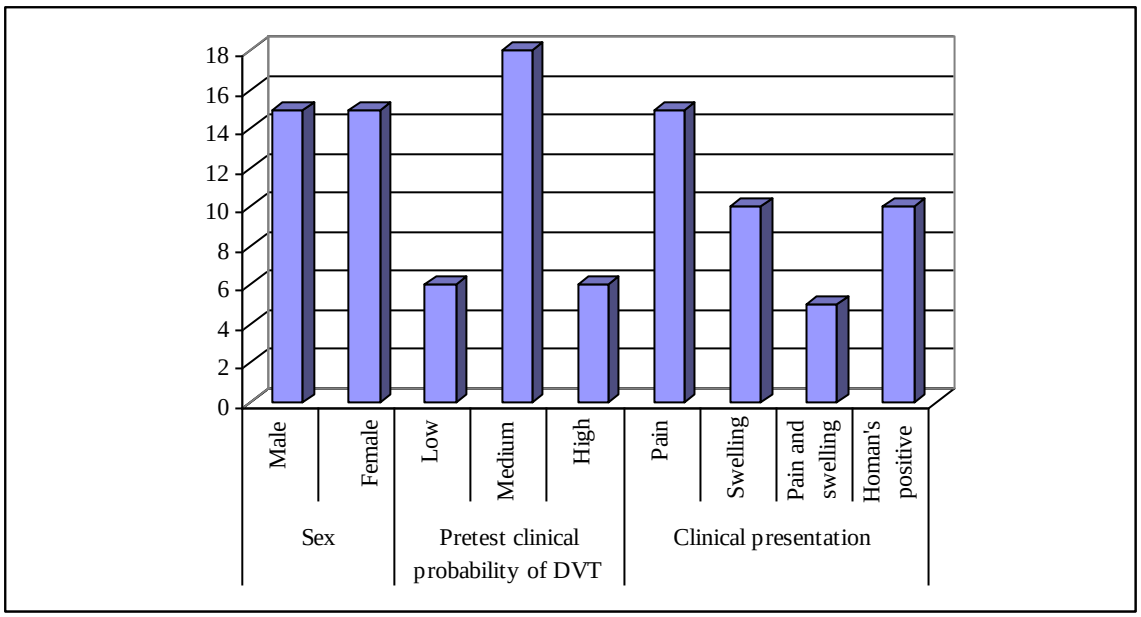
In our study when Duplex imaging, compared to Contrast Venography it had a sensitivity of (95.5%),specificity of (87.5), PPV, of (95.5%) and N P V, of (87.5%) ***table (12 )( Graph M).***

### *C- MAGNETIC RESONANCE IMAGING*

In our study Magnetic Resonance Venography (MRV) had the same findings as that of Contrast Venography with complete agreement between findings in C V and M R V. that yielding a sensitivity for M R V (100 %), specificity (100%), PPV of (100 %) and N P V of (100%). ***table (13) (Graph N)***

Table (1): Character of our studied patients ,distribution of age, sex their clinical presentation and clinical probability

| Character | N=30 | |
|---|---|---|
| | No | % |
| Age (years) | | |
| Mean ± SD | 43.6 ±5.2 | |
| (range) | 38-58 | |
| Sex | | |
| Male | 15 | 50.0 |
| Female | 15 | 50.0 |
| Total | 30 | 100 |
| Pretest clinical probability for DVT | | |
| Low | 6 | 20.0 |
| Medium | 18 | 60.0 |
| High | 6 | 20.0 |
| Total | 30 | 100 |
| Clinical presentation | | |
| Pain | 15 | 50.0 |
| Swelling | 10 | 33.3 |
| Pain and swelling of affected limb | 5 | 16.7 |
| Homan's positive | 10 | 33.3 |

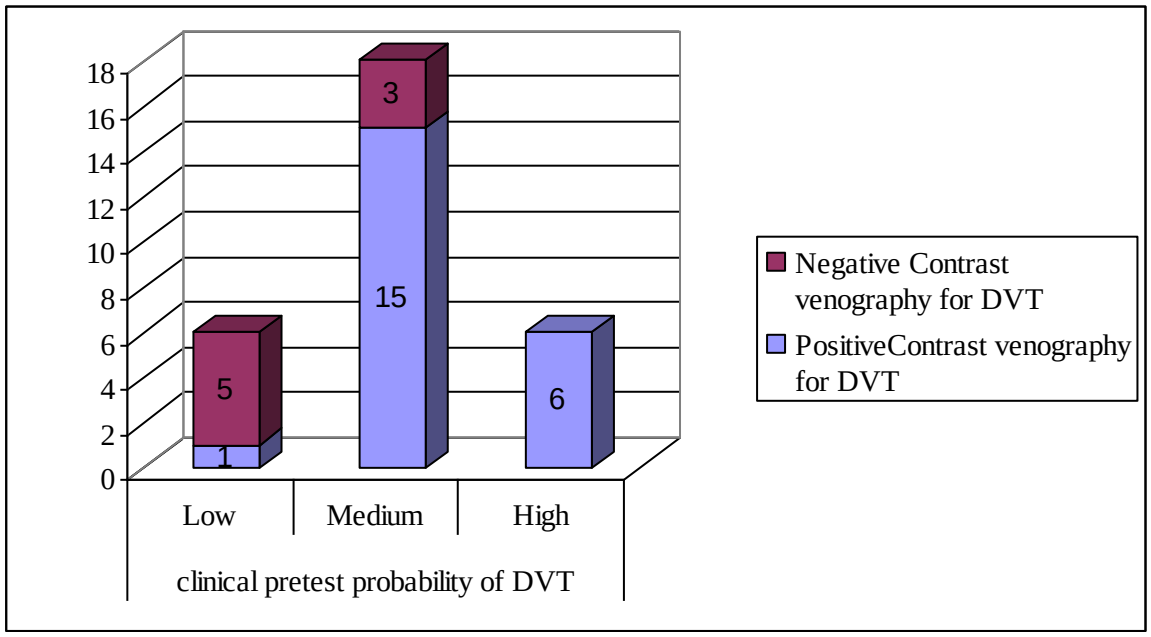



Graph (A): Graphic distribution of studied patient according to their sex clinical presentation, and clinical probability.

Table (2): Relationship between findings of Contrast Venography and clinical pretest probability of DVT

| clinical pretest probability of DVT | Contrast venography for DVT | | | | $X^2$ | P |
|---|---|---|---|---|---|---|
| | Positive n=22 | | Negative n=8 | | | |
| | No | % | No | % | | |
| Low | 1 | 4.5 | 5 | 62.5 | | |
| Medium | 15 | 68.2 | 3 | 37.5 | 12.95 | <0.001 |
| High | 6 | 27.3 | 0 | 0 | | |
| Total | 22 | 100 | 8 | 100 | | |

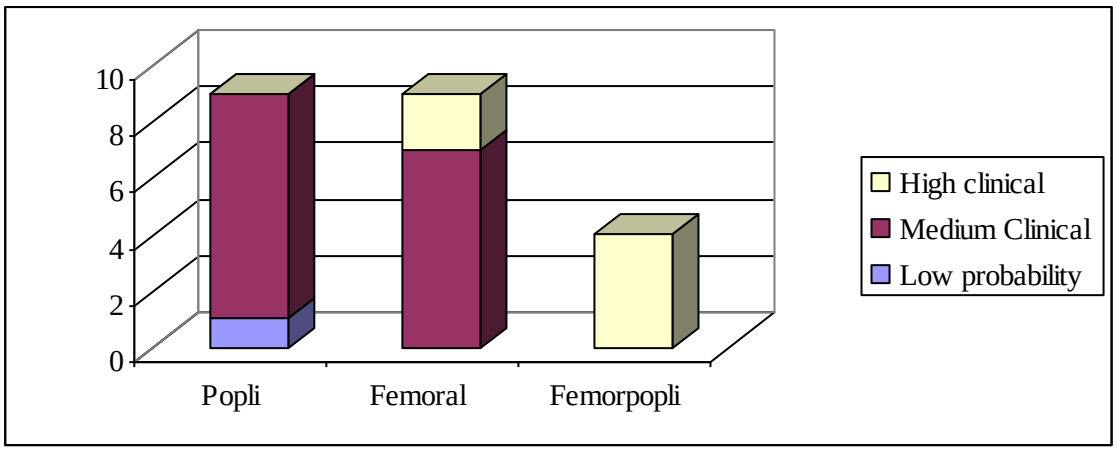
Measurement of agrrement Kappa=1.0 .P<0.001




Graph (B): Showing Distribution of D V T in studied patients according to their clinical pretest probability and their Contrast Venography findings. Among( 6) cases of low clinical probability only (one) case had a D V T ,among (18) cases of medium clinical probability (15) cases had D V T and all (6) cases of high clinical probability had D V T

Table (3) Distribution of cases according to their clinical probability and sites of thrombosis

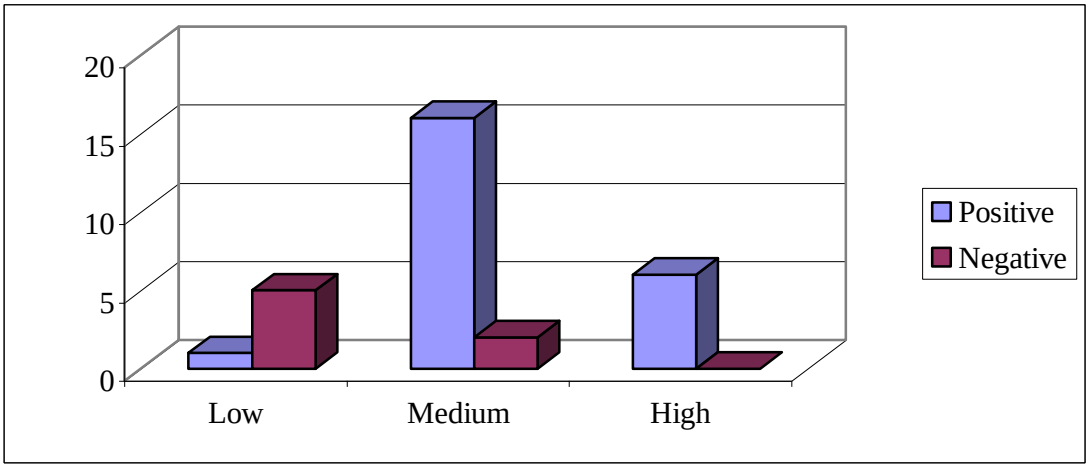
| Clinical probability | | | Site of DVT as shown by CV | | | Total no with DVT |
|---|---|---|---|---|---|---|
| | Total no | DVT | Popli | Femoral | Femorpopli | |
| Low probability | 6 | 1 | 1 | - | - | 1 |
| Medium Clinical | 18 | 15 | 8 | 7 | - | 15 |
| High clinical | 6 | 6 | - | 2 | 4 | 6 |
| Total | 30 | 22 | 9 | 9 | 4 | 22 |



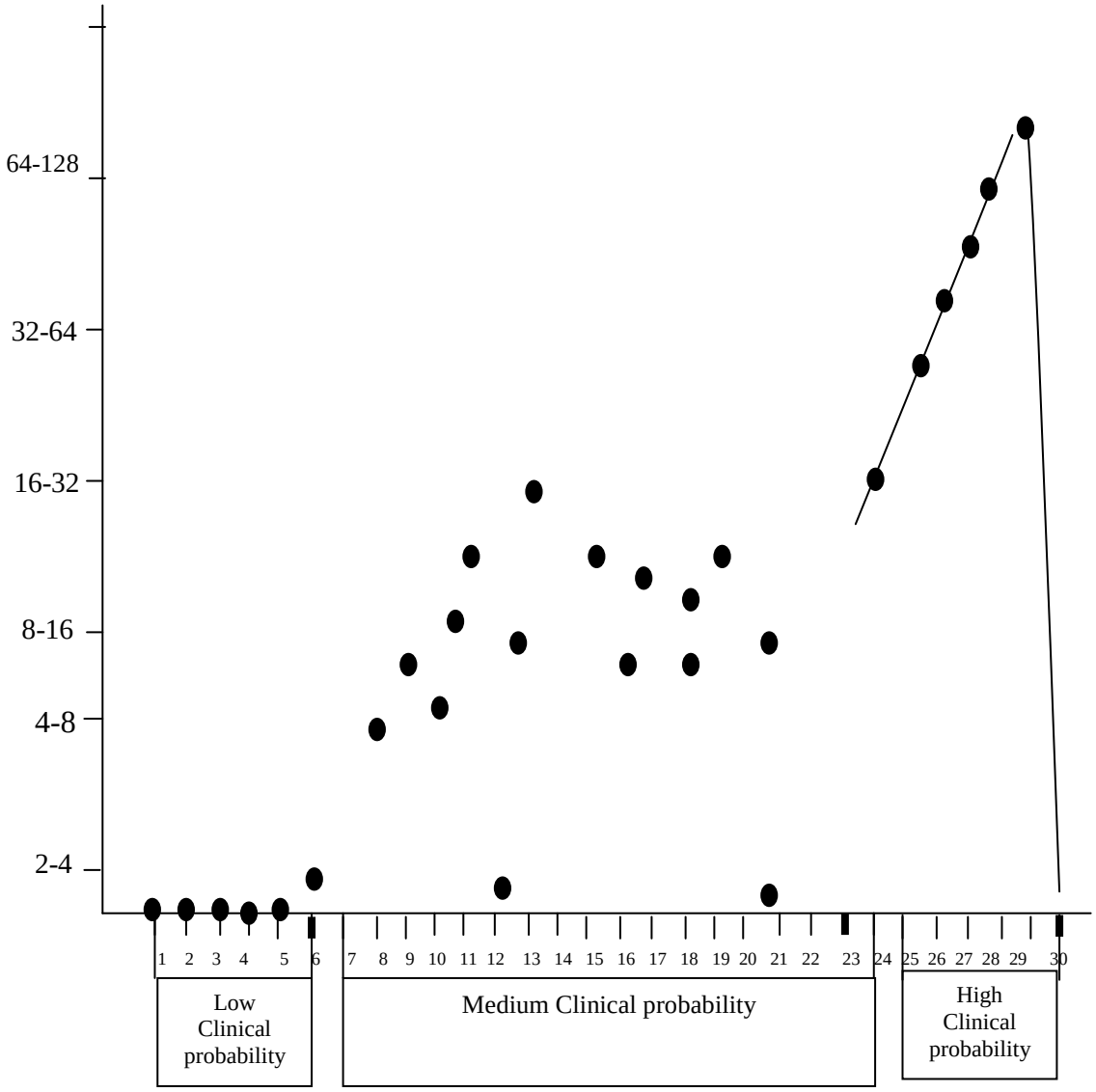

Graph (C):Showing distribution of sites of thrombosis in relation to their clinical probability ,in our study we have (9)cases of popliteal D V T (one case of low clinical probability plus 8 cases of medium probability), (9)cases of femoral D V T (7casesof medium probability plus 2cases of high probability ) and (4)cases femropopliteal D V T with high clinical probability

Table (4): Relationship between the result of D-dimer test and the clinical probability of our studied patients which revealed a considerable number of patients with a low probability group had negative D- dimer test

| clinical pretest probability of DVT | D-dimer | | | | $X^2$ | P |
|---|---|---|---|---|---|---|
| | Positive n=23 | | Negative n=7 | | | |
| | No | % | No | % | | |
| Low | 1 | 4.3 | 5 | 71.4 | | |
| Medium | 16 | 69.5 | 2 | 28.60 | 8.57 | <0.05 |
| High | 6 | 26.2 | 0 | 0 | | |
| Total | 23 | 100 | 7 | 100 | | |




Graph (D)Showing only one case among the(6) cases with low clinical probability was positive for D –dimer , (16) cases out of (18)cases with medium clinical probability were positive for D –dimer and all (6)cases of high clinical were positive for D – dimer test



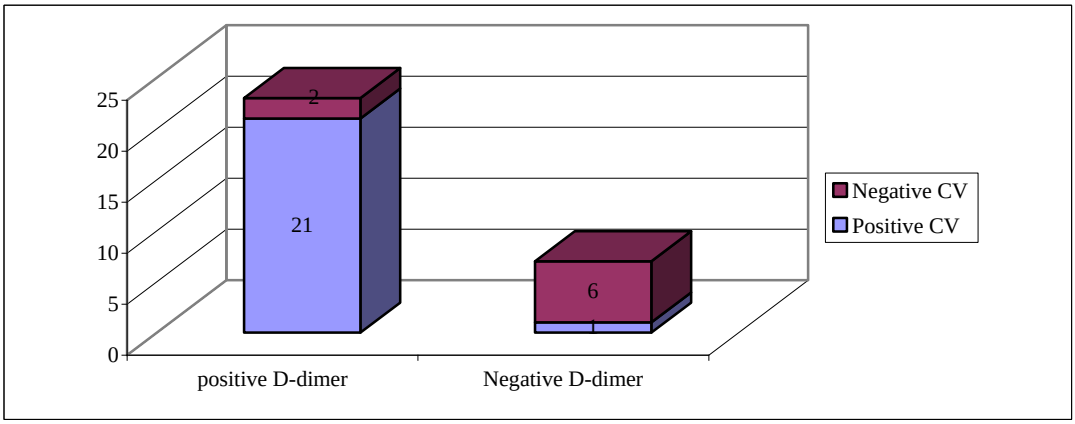

Graph (E) Showing the semi quantitative assay of D dimer test among our studied cases according to their clinical probability, among the( 6) cases of low probability we had only one case with a positive D dimmer test (2-4 µg).

Among 18 cases of medium clinical probability (16) cases were positive for D dimmer test with a level ranged between (2-4 µg) to (16-32µg).

All the (6) cases of high clinical probability had a positive D- dimer test with a level ranged between (16-32µg) up to (64-128µg) in one case only that had developed pulmonary embolism.

Table (5):showing the sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of D-dimer test when compared to Contrast Venography . Among the twenty three positive D dimer cases , twenty one patients had a D V T confirmed by C V and among the remaining seven cases with negative D dimer , only one case had D V T confirmed by C V

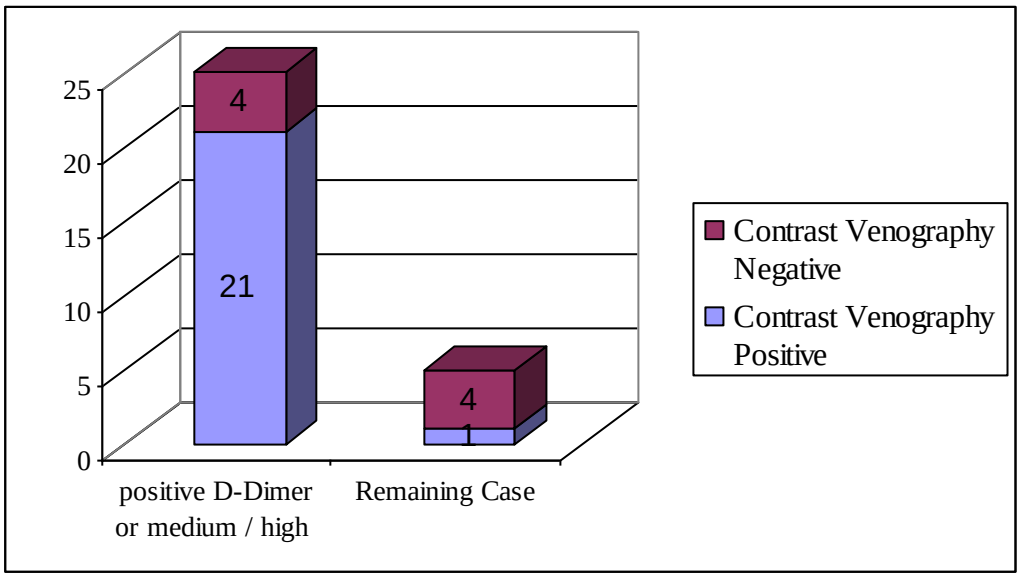
| D-dimer | Contrast Venography | | Sensitivity % | Specificity % | PPV % | NPV % |
|---|---|---|---|---|---|---|
| | positive | negative | | | | |
| Positive | 21 | 2 | | | | |
| Negative | 1 | 6 | 95.5 | 75 | 91.3 | 85.7 |
| Total | 22 | 8 | | | | |




Graph (F) Showing that among the (23) cases that were positive for D –dimmer we had ( 21)cases with D V T confirmed by Contrast Venography , and only one case had a D V T among the( 7 )cases that were negative for D –dimer test

Table (6): sensitivity, specificity, positive predictive value(P P V and negative predictive value(N P V ) of D –dimer when a positive D-dimer ***or*** medium / high clinical pretest probability combined together and compared to C V

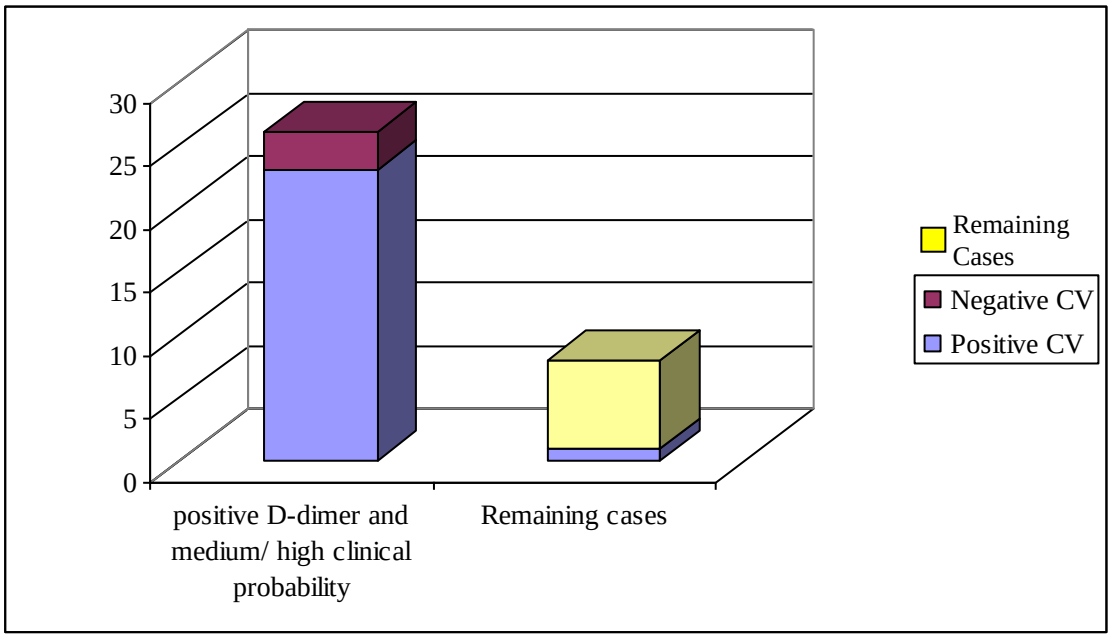
| positive D-dimer ***or*** medium /high clinical pretest probability of DVT | Contrast Venography | | Sensitivity % | Specificity % | PPV % | NPV % |
|---|---|---|---|---|---|---|
| | positive | negative | | | | |
| Positive | 21 | 4 | | | | |
| Negative | 1 | 4 | 95.5 | 50 | 84 | 80 |
| Total | 22 | 8 | | | | |




Graph (G ) According to this graph, among (twenty five) cases with a positive D -dimer or medium to high clinical probability, a( twenty one) cases had D V T and the other four cases had no D V T , and only one case among the remaining five cases had a D V T as confirmed by CV

Table (7): sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of D –dimer , when a positive D-dimer ***and*** medium /high clinical pretest probability combined together and compared to C V

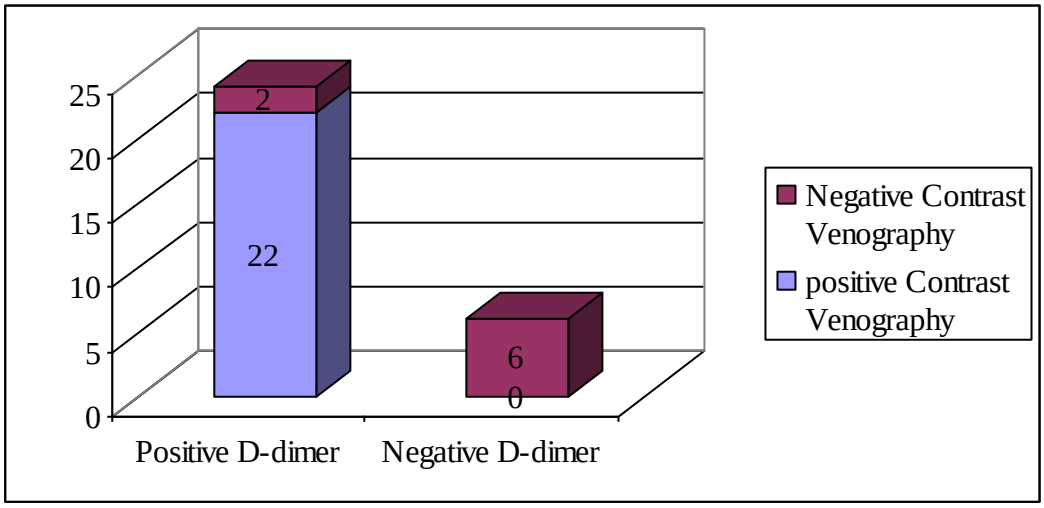
| positive D-dimer ***and*** medium /high clinical pretest probability of DVT | Contrast Venography | | Sensitivity % | Specificity % | PPV % | NPV % |
|---|---|---|---|---|---|---|
| | positive | Negative | | | | |
| Positive | 21 | 2 | | | | |
| Negative | 1 | 6 | 95.5 | 75 | 91.3 | 85.7 |
| Total | 22 | 8 | | | | |




Graph (H) According to this graph among (23)cases of positive D dimer ***and*** medium to high clinical probability(21) caes had D V T and (2)cases had no D V T , and among the remaining seven cases only one case had a D V T as confirmed by C V

Table (8): sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of D-dimer test when positive D-dimer cases ***or*** Duplex findings combined together and compared to C V as gold standard, with increased sensitivity and specificity up to (100%)

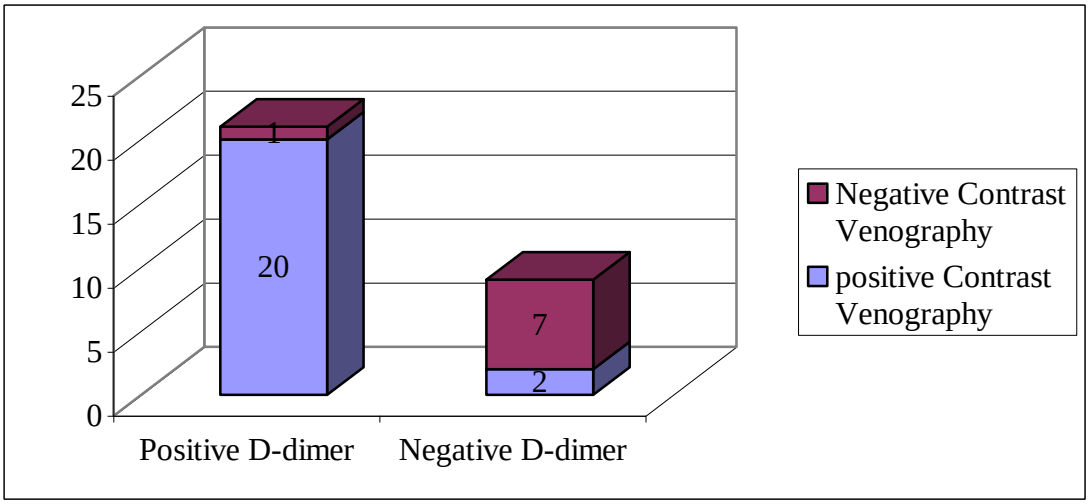
| Positive D-dimer ***or*** Duplex | Contrast Venography | | Sensitivity % | Specificity % | PPV % | NPV % |
|---|---|---|---|---|---|---|
| | positive | negative | | | | |
| Positive | 22 | 2 | | | | |
| Negative | 0 | 6 | 100 | 75 | 91.6 | 100 |
| Total | 22 | 8 | | | | |




Graph (I) When a positive D –dimer or Duplex combined together and compared to C V ,it has been found that among (24) cases of positive D –dimer or Duplex findings (22)cases had D V T and the other (2)cases had no D V T , and the remaining (6)cases had no D V T

Table (9): sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of D-dimer when positive D dimmer ***and*** Duplex combined together and compared to C V

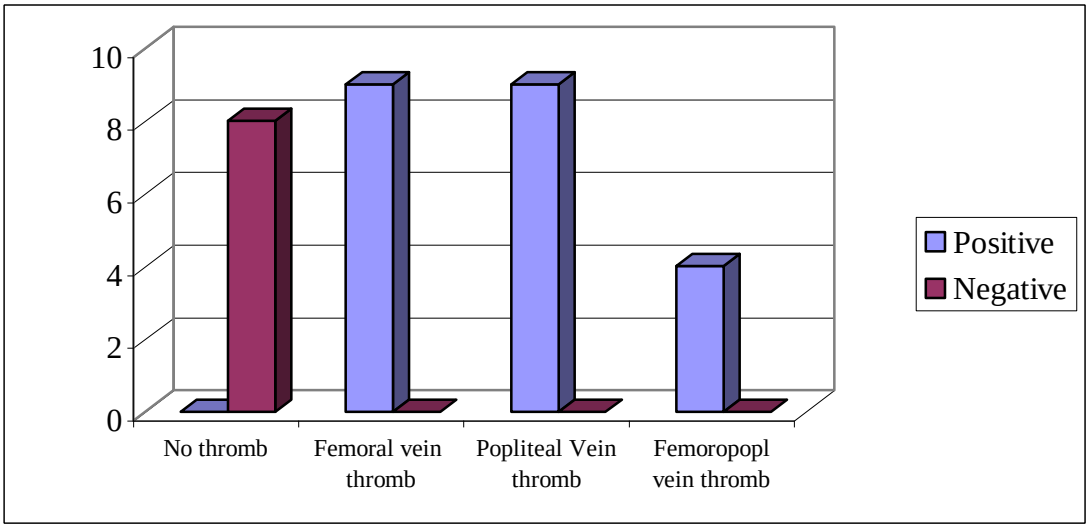
| Positive D-dimer ***and*** Duplex | Contrast Venography | | Sensitivity % | Specificity % | PPV % | NPV % |
|---|---|---|---|---|---|---|
| | positive | Negative | | | | |
| Positive | 20 | 1 | 91.9 | 87.5 | 95.2 | 77.7 |
| Negative | 2 | 7 | | | | |
| Total | 22 | 8 | | | | |




Graph (J).showing that among (21) cases of positive D –dimmer and duplex findings (1) case had no D V T and (20)cases had D V T and in the remaining (9) cases , (2) cases had D V T and (7) cases had no D V T

Table (10) Results of Contract Venography and distribution of cases according to their sites of thrombosis

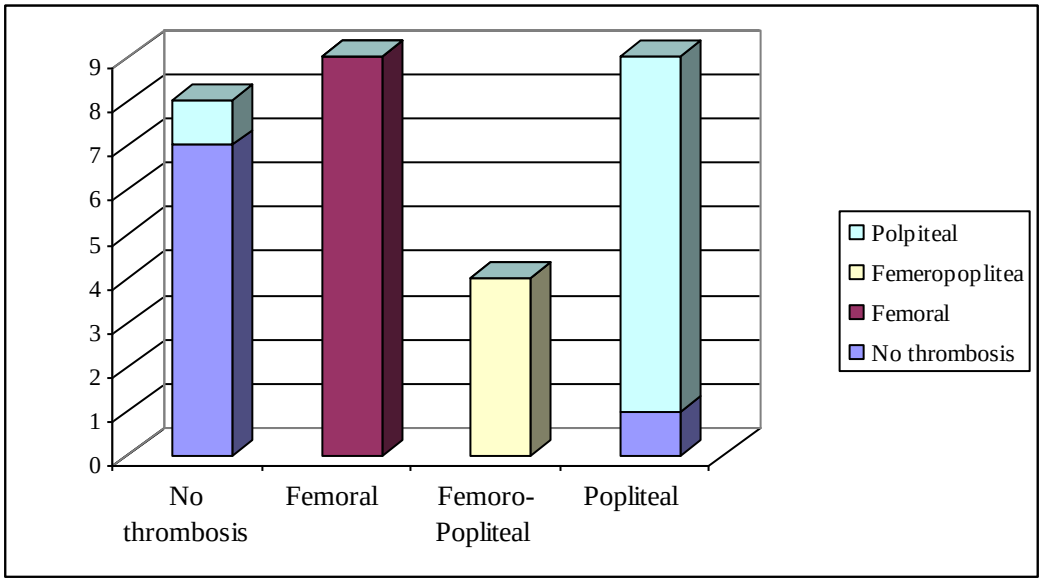
| NO | Contrast Venography | | | | | | | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No thromb | | Femoral vein thromb | | Popliteal Vein thromb | | Femoropopl vein thromb | | | |
| | No | % | No | % | No | % | No | % | No | % |
| Positive | - | - | 9 | 30 | 9 | 30 | 4 | 13.3 | 22 | 73.3 |
| Negative | 8 | 26.7 | - | - | - | - | - | - | 8 | 26.7 |
| Total | 8 | | 9 | | 9 | | 4 | | 30 | 100 |




Graph (K)showing distribution of cases that had D V T according to their sites of thrombosis ,(9) cases had popliteal D VT , (9)cases had femoral vein thrombosis and (4) cases had femoropopliteal vein thrombosis

Table (11): Distribution of thrombi as detected by ***Contarst Venography*** and ***Duplex*** study

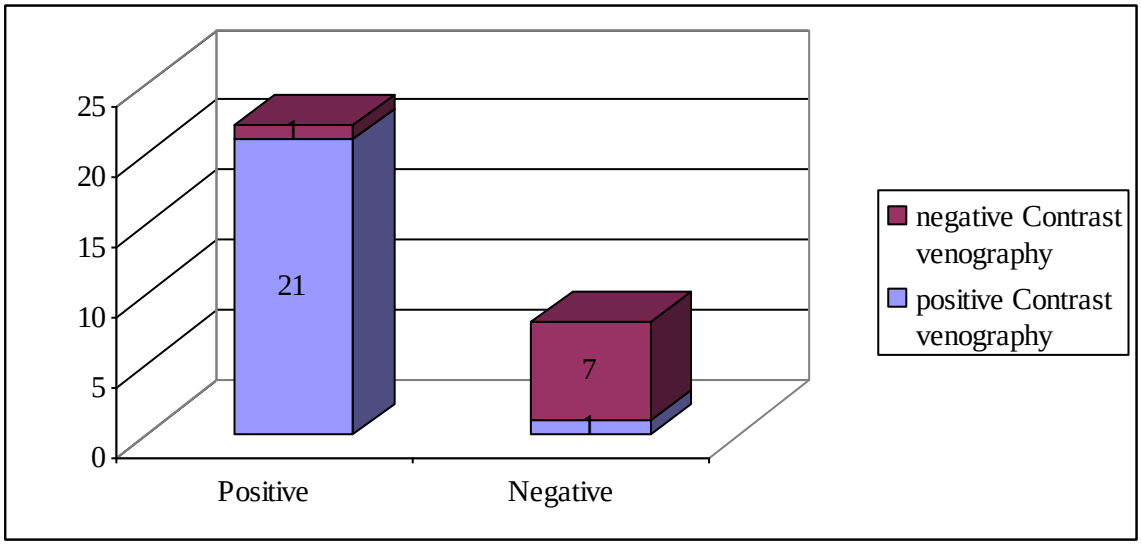
| Duplex | Contrast venography | | | | | | | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No thrombosis | | Femoral vein thrombosis | | Femoro-Popliteal vein thrombosis | | Popliteal vein thrombosis | | | |
| | No | % | No | % | No | % | No | % | No | % |
| No thrombosis | 7 | 87.5 | - | - | - | - | 1 | 11.1 | 8 | 26.7 |
| Femoral | - | - | 9 | 100 | - | - | - | - | 9 | 30.0 |
| Femeropoplitea | - | - | - | - | 4 | 100 | - | - | 4 | 13.3 |
| Polpiteal | 1 | 12.5 | - | - | - | - | 8 | 88.9 | 9 | 30.o |
| Total | 8 | 100 | 9 | 100 | 4 | 100 | 9 | 100 | 30 | 100 |




Graph (L): According to this graph ,***Duplex study*** had revealed no evidence of DVT in (8) cases among them ***one case missed*** as had no D V T but proved by C V to have a popliteal DVT ,(9) cases had a popliteal vein thrombosis as detected by Duplex imaging among them one case had No D V T as confirmed by ***C*** V, (4) cases had a femoropopliteal vein thrombosis in complete agreement with C V and (9)cases had femoral vein thrombosis in agreement with C V

Table (12): sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of ***Duplex study*** when compared to C V

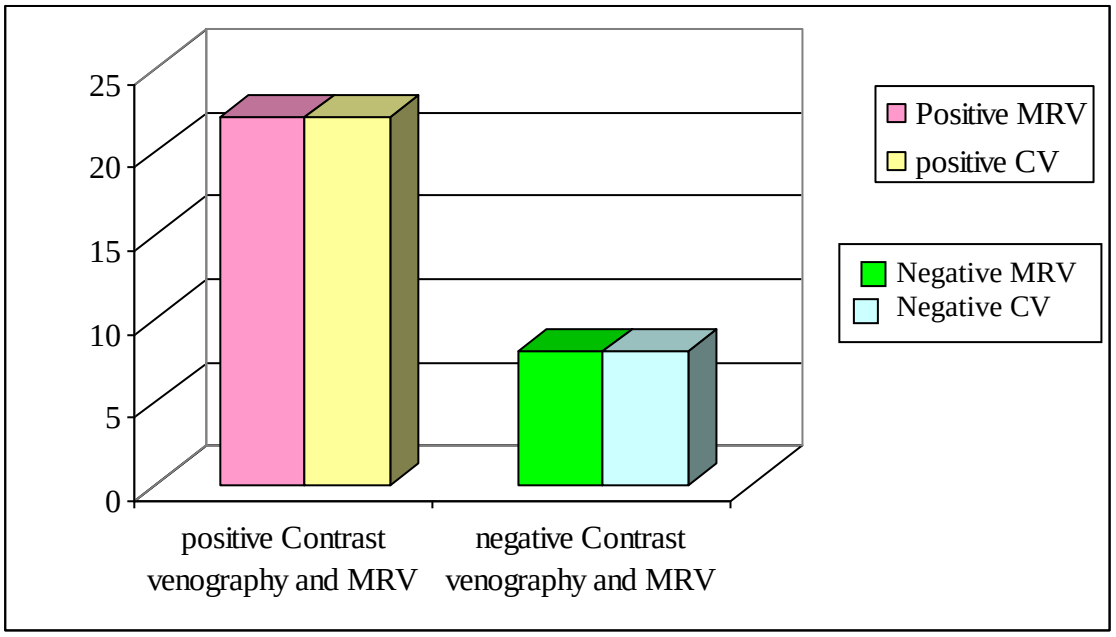
| Duplex study | Contrast venography | | Total | | Sensitivity % | Specificity % | PPV % | NPV % |
|---|---|---|---|---|---|---|---|---|
| | positive | negative | No | % | | | | |
| Positive | 21 | 1 | 22 | 73.7 | 95.5 | 87.5 | 95.5 | 87.5 |
| Negative | 1 | 7 | 8 | 26.3 | | | | |
| Total | 22 | 8 | 30 | 100 | | | | |




Graph (M):showing that among (22)cases that had Duplex findings of D V T ,(1) case had no D V T as confirmed by C V and among the remaining (8) cases that had no evidence of D V T according to their Duplex findings (1) case missed by duplex as had no D V T but confirmed to have a D V T as evidenced by C V

Table (13): sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of ***Magnetic Resonance venography*** for diagnosis DVT when compared to C V. with complete agreement in both studies

| MRV | Contrast venography | | Sensitivity % | Specificity % | PPV % | NPV % |
|---|---|---|---|---|---|---|
| | positive | Negative | | | | |
| Positive | 22 | 0 | 100 | 100 | 100 | 100 |
| Negative | 0 | 8 | | | | |
| Total | 22 | 8 | | | | |

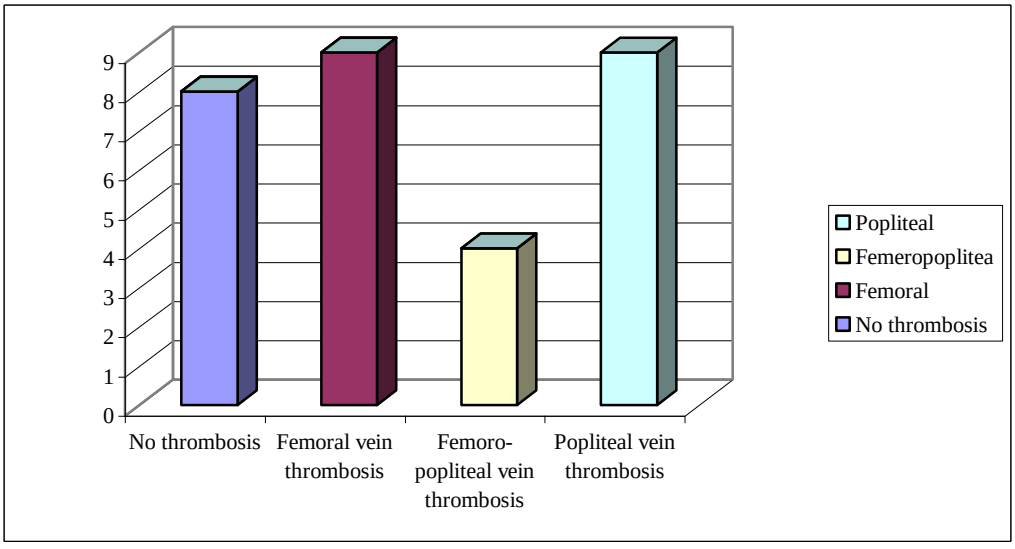



Graph (N) Relationship between ***Contrast Venography*** and ***Magnetic Resonance Venography*** with complete agreement between both studies

Table (14): Distribution of cases and their site of thrombosis in ***Contrast Venography*** and ***MRV*** which showed complete agreement in both studies as regard to the sites of thrombosis

| MRV | Contrast Venography | | | | | | | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No thrombosis | | Femoral vein thrombosis | | Femoro-popliteal vein thrombosis | | Popliteal vein thrombosis | | | |
| | No | % | No | % | No | % | No | % | No | % |
| No thrombosis | 8 | 100 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 26.7 |
| Femoral | 0 | 0 | 9 | 100 | 0 | 0 | 0 | 0 | 9 | 30.0 |
| Femeropoplitea | 0 | 0 | 0 | 0 | 4 | 100 | 0 | 0 | 4 | 13.3 |
| Popliteal | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 100 | 9 | 30.0 |
| Total | 8 | 100 | 9 | 100 | 4 | 100 | 9 | 100 | 30 | 100 |

Measure of Agreement Kappa =0.862, p <0.001




Graph (O)showing distribution of cases according to their sites of thrombosis with complete agreement between M R V findings and C V findings