Incidence of upper extremity thrombosis in pulmonary thromboembolism

Hatice Kilic¹, Aysegul Senturk¹, Hatice Canan Hasanoglu², Funda Karaduman Yalcin², Tuba Ogut¹, Aysegul Karalezli¹

¹Department of Pulmonology, Ankara Atatürk Research and Training Hospital, Ankara, Turkey
²Department of Pulmonology, Yildirim Beyazit University Faculty of Medicine, Ankara, Turkey
³Department of Pulmonology, Sinop Boyabat 75th State Hospital, Sinop, Turkey

*Corresponding Author: Sinop Boyabat 75th State Hospital, Department of Pulmonology, Erol Demirkol Caddesi, Camlica Mahallesi, Sinop/Turkey
Tel: +903683151013 Fax: +903683152985
E-mail: dr.fundakaraduman@gmail.com

Key words: Pulmonary embolism; thrombosis; upper extremity

Received: 31.03.2014     Accepted: 29.03.2014    e-published: 27.05.2014

Abstract

Objectives: Venous thromboembolism is a clinical condition that often occurs from deep vein thrombosis of lower extremity. The incidence of deep venous thrombosis in the etiology of pulmonary thromboembolism may be as high as 90%. Doppler ultrasonography of lower extremities is recommended generally to determine the etiology of pulmonary thromboembolism. The aim of this study is to present the importance of upper extremity thrombosis in pulmonary thromboembolism.

Materials and Methods: Between 2010-2012, 236 patients followed with the diagnosis of pulmonary thromboembolism were included in the study. Lower and upper extremity Doppler examination was performed to all patients to determine the cause.

Results: The mean age of patients is 64.7 ± 16.9 (22-95); 56.8% (134) were female, 43.2% (102) were men. According to the classification of pulmonary thromboembolism, 37 (15.7%) patients had massive, 103 (43.6%) patients had submassive, 96 (40.7%) patients had nonmassive embolism. Lower extremity deep venous thrombosis was detected in 109 (46.2%) patients, both lower and upper extremity in 10 (4.2%) patients and only upper extremity in 20 (8.4%) patients. Eventually, deep venous thrombosis was detected in 129 (54.6%) patients. Thrombosis of the upper extremity was detected in 20 (16.8%) patients.

Conclusions: Upper extremity thrombosis has been found as important as lower extremity thrombosis in the etiology of venous thromboembolism. Upper extremity thrombosis does not always occur in patients with malignancy or central venous catheters. It should be kept in mind that, in hospitalized patients with peripheral vascular vein catheter, the upper extremity thrombosis may also occur.

Introduction

Venous thromboembolism (VTE) is a clinical condition that often occurs from deep vein thrombosis (DVT) of lower extremity. In hospitalized patients to prevent the development of pulmonary thromboembolism (PTE), preventive measures are usually taken for the primary underlying cause is the lower extremities thrombosis. The clinicians often ignore upper extremity thrombosis (UET) in all cases except the patients with central venous catheter inserted.

Upper extremity thrombosis usually occurs secondary to clotting disorders and are classified as secondary. It is seen after heavy exercise often in young men that is called Paget-Schroetter Syndrome. It is defined as primary when occurs due to structural abnormalities. Cases of unknown cause are also grouped as idiopathic (1). The senility and obesity are less monitored in the etiology of UET, patients are usually young men with high physical activity (2-4). There is often a history of malignancy in patients with UET and UET is usually observed after surgery in the short term or occurs in intensive care unit (1,2).
Incidence of upper extremity thrombosis in pulmonary thromboembolism

Kilic et al.

Research Article

Factors for UET (1,2,4-9).

We aimed to determine the incidence of UET in the etiology of PTE and to identify the reasons that led to UET in this study.

Materials and Methods

Between 2010-2012, 236 patients followed with the diagnosis of PTE were included. PTE were diagnosed in all patients by the Toshiba Aquilion brand, 64-detector, multislice computed tomography-angiography. Age, gender, comorbidities and smoking habits of all patients were recorded. Complaints of patients on admission were noted. In addition, measurements of arterial blood pressure and oxygen saturation of all patients were recorded on admission. Transthoracic echocardiography were performed to all patients. According to the clinical classification of PTE, patients were classified as massive, submassive and nonmassive. Laboratory tests of the serum D-dimer, troponin, creatine kinase (CK), creatine kinase-myocardial brain (CK-MB) and pro Brain natriuretic peptide (proBNP) levels were recorded. Lower and upper extremity Doppler, compression ultrasonography (USG) examination by Logiq 9 brand ultrasound machine was performed to all patients to determine the cause of PTE. For the treatment of PTE, thrombolytic agents, low molecular weight heparin (LMWH) and her warfarin therapy were employed. Artery (RCA), optus marginalis 1 and 2 (OM-1, OM-2) respectively. At the time of surgery, the LAD stenosis of 40% had been deemed as moderate and any revascularization for LAD had not been performed. Two patients had a history of PCI, with stent implantation to LAD and RCA respectively.

Statistical Analysis

The findings of the study were assessed for statistical analysis using SPSS (Statistical Package for Social Sciences) 20.0 program. Descriptive statistics were computed for each of the variables analysed. Results are presented as mean ± standard deviation (sd). In order to compare the different groups stratified by age and sex, the independent samples t-test and Chi-squared test were used. Kruskal-Wallis test were used for comparison of the average the independent samples more than two groups for nonparametric data. P-value <0.05 was considered significant.

Results

The mean age of patients was 64.7±16.9 (22-95); 56.8% (134) were female and 43.2% (102) were male. Seventy-one (71) of the patients (30.1%) were smokers, 165 (69.9%) were non-smokers. The mean age of the patients and smoking habits were compared according to gender; the average age of female patients was significantly higher than male patients (66.9 ± 16.2 vs. 61.8 ± 17.3, p<0.02) and smoker male patients was found to be significantly more than female patients (55 vs. 16, p<0.001).

A hundred and ninety-four (194) patients (82.2%) had dyspnea, 147 patients (62.3%) had retrosternal pain and 23 patients (9.7%) had hemoptysis on admission. According to the results of laboratory tests; the median D-dimer levels were 4300 (355–>10000) ng/mL, troponin: 6.1 (0-945) ng/mL, CK: 60 (0-2200) ng/mL, CK-MB: 1.8 (9-451) ng/mL, and Pro ProBNP: 410 (0-9000) pg/mL. According to the clinical classification of PTE, 37 patients (15.7%) had massive, 103 patients (43.6%) had submassive and 96 patients (40.7%) had nonmassive PTE. Symptoms and laboratory test results on admission were compared according to the clinical classification and there was no significantly difference between type of PTE and the complaints of patients during admission.

Results of examination of upper and lower extremities Doppler USG; lower extremity DVT was observed in 109 patients (46.2%), both lower and upper extremities DVT was observed in 10 patients (4.2%) and 20 patients (8.4%) had only upper extremity DVT. In 129 patients (54.6%) DVT was detected. Upper extremity thrombosis was observed in 20 (8.4%) of the patients with thrombosis. Also, superficial venous thrombosis in the upper extremity was observed in 15 cases (6.3%) (Table 2). Upper extremity trombosis (UET) was observed in brachial vein in 14 patients (70%) and in axillary vein in 6 patients (30%). Bilateral brachial UET was revealed in two cases. In the first case, the underlying cause was colon carcinoma, and the second case had a history of journey.

None of the patients with UET had central venous catheters. One patient had a history of malignancy (colon adenocarcinoma), 3 patients were immobile, 3 patients had previous PTE, 2 patients had history of operations, 2 patients had history of journey, one patient used oral contraceptive, one patient with arrhythmia and one patient with a history of trauma. Thrombolytic therapy was administered in 61 patients (25.8%), LMWH therapy was given to 229 patients (97%) and warfarin therapy was given to 182 patients (77.1%) for the treatment of PTE.

The mean age of the patients with UET was 63.1±22.4, whereas 64.6±16.7 in ones without UET (p:0.80). There were 10 female patients (50%) in UET group and 124 patients (57.4%) in non-UET group (p: 0.52). Symptoms and laboratory results of patients with UET on admission are shown in Table 1.

Discussion

The incidence of upper extremity thrombosis was detected 8.4% in all patients and was detected 16.8% in patients with DVT in this study.
In a conducted study, the frequency of UET has been determined as 7% in patients with PTE. Untreated patients with UET has been shown to occur PTE in 94% (10). In another study, UET was detected approximately 10% of patients who developed DVT (10,11). The annual incidence of UET was diagnosed 4%. 75-80% of cases constitute the second-ary UET; patients with central venous catheter inserted and with malignancies have constituted the majority (11-13).

It has been shown that the diagnosis of UET has been increasing, however only 0,2% of cases had symptoms in a study. Therefore, for the diagnosis of UET, primarily clinicians should bring the diagnosis to mind. In the mentioned study, in 84% of the cases, there was a central venous catheter and only in 44% of patients, central venous catheter-associated UET had been identified. (14,15).

Deep veins of upper extremity are radial, ulnar, brachial, axillary, subclavian, internal jugular and brachiocephalic veins. Cephalic and basilic veins constitute the superficial veins of the upper extremity and they pour into the axillary vein (16). In our study, 20 cases (8,4%) of all had deep UET, and superficial vein thrombosis was observed in 10 cases (4,2%).

Upper extremity thrombosis most often occurs in the in-ternal jugular vein, followed brachial and axillary veins, respectively. In our study, brachial vein thrombosis was observed in 14 patients (70%) and axillary vein thrombo

<table>
<thead>
<tr>
<th>Table 1. Symptoms and laboratory results of patient with upper extremity deep vein thrombosis upon admission</th>
</tr>
</thead>
<tbody>
<tr>
<td>The patients with UET (n=30) (6,4%)</td>
</tr>
<tr>
<td>Symptons</td>
</tr>
<tr>
<td>Dyspnea (%)</td>
</tr>
<tr>
<td>Retrosural pain (%)</td>
</tr>
<tr>
<td>Hemoglobin (%)</td>
</tr>
<tr>
<td>Results of laboratory</td>
</tr>
<tr>
<td>D-dimer (mg/dl)</td>
</tr>
<tr>
<td>Troponin (mg/dl)</td>
</tr>
<tr>
<td>CK (U/l)</td>
</tr>
<tr>
<td>CK-MB (U/l)</td>
</tr>
<tr>
<td>pro-BNP (pg/ml)</td>
</tr>
</tbody>
</table>

In the literature, the incidence of lower extremity DVT has been reported to be more than upper extremity DVT. But complications due to upper extremity thrombo-sis have been described more than lower extremity DVT. The incidence of PTE, recurrence of DVT and post-thrombotic syndrome complications of UET were found to be 5-14%, 2-5% and 10-28, respectively (19-21). UET associated with malignancies are often observed in ovary, brain and pancreatic cancer (22). In our study, only one patient has a colon adenocarcinoma with UET.

Guidelines suggest therapy for 3 months in UET (23-25). Low molecular weight heparin, fondaparinux or conven-tional heparin are suggested for the treatment. The initial treatment is usually recommended as; conventional heparin 1000-1250 U/h, LMWH and fondaparinux are preferred in patients with high risk of bleeding. Warfarin therapy is recom-mended in long term maintenance. However, in the CLOT study, LMWH was found to be superior to warfarin to prevent the recurrence in patients with active cancer. Thrombolytic therapy, thrombolysis with catheter and surgical options are available in studies of small series in UET associated with central catheter. These procedures were not superior to anti-coagulation (25). In our study, LMWH was administrated in initial treatment and warfarin therapy for maintenance.
Upper and lower extremity thrombosis were compared for mortality, recurrence and postthrombotic syndrome in REITE study. It was shown that mortality in UET was not significantly different than lower extremity thrombosis (16). Postthrombotic syndrome appears to constitute a higher proportion of UET in axillary and subclavian veins (25).

In conclusion, UET is seen more frequently than expected and have nearly same complications and mortality with lower extremity thrombosis; its frequency was determined as 8.4% in our study. Therefore, upper extremity Doppler USG should be performed to patients without thrombosis in the lower extremities that were followed for PTE. If UET is determined in patients without central catheter, malignancy and thrombophilic factors should be investigated. Upper extremity thrombosis is more common than estimated, so patients should be closely followed up for prevention of complications and mortality.

Acknowledgements

None

Conflicts of Interest

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

References


Incidence of upper extremity thrombosis in pulmonary thromboembolism

Kilic et al.