THE ROLE OF COMBINED CT PULMONARY ANGIOGRAPHY & INDIRECT CT VENOGRAPHY IN THE DIAGNOSIS OF THROMBO-EMBOLIC DISEASE

Essay

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List of Abbreviations

cm.	Centimeter
CPR	Cardiopulmonary resuscitation
CT	Computerized Tomography
CTA	Computerized Tomography Angiography
CTPA	CT Pulmonary Angiography
CTV	Computerized Tomography Venography
CTVPA	CT Venoous Pulmonary Angiography
DVT	Deep venous thrombosis
ECG	Electrocardiography
HU	Hounsfield
ICU	Intensive Care Unit
IV	Intravenous
IVC	Inferior Vena Cava
kV	Kilo Volt
mAs	Milliampere Second
MDCT	Multi-Detector Row Computerized Tomography
MSCT	Multi-slice CT
Mg	Milligram
Ml	Milliliter
mm	Millimeter
P_2	Pulmonary valve component of second heart sound
PE	Pulmonary Embolism
Sec	Second
SSCT	Single-slice CT
Um	Micrometer
US	US
Vs.	Versus
VTE	Venous Thromboembolism

List of Tables

List of figures

Introduction

Pulmonary embolism is a life threatening disease and one of the commonest chest emergencies. It affects between 40.000 - 200.000 patients annually in the United States alone (***Cham et al. 2005)***.

Pulmonary embolism is a well recognized sequel of DVT of the lower extremities. Studies have shown that inadequately treated DVT is associated with recurrent pulmonary embolism. Proper treatment is estimated to decrease mortality by as much as 30% **(*Yankelevitz et al. 2000*)**.

To diagnose thromboembolic disease in patients suspected of having pulmonary embolism,several investigators have developed helical CT protocols that depict both pulmonary embolism and lower extremity DVT. This technique has been referred to as Combined CT Pulmonary Angiography & Indirect CT Venography ***(Cham et al.2005)***.

CT Venous Pulmonary Angiography (CT VPA) provides a non-invasive method for the imaging of suspected embolic disease in pulmonary arteries as well as comprehensive study of the venous system ***(Katz et al., 2002)***.

As regards the benefits of Indirect CT Venography; it allows examination of pelvis and lower extremities by using only the contrast material already present in the circulation from the preceding CT Pulmonary Angiography .Also,the addition of Indirect CT Venography to the standard CT Pulmonary Angiographic protocol requires only an additional 3 minutes to perform. It maximally enhances the pelvic and lower extremity veins,while maintaining optimum pulmonary arterial enhancement during CT Pulmonary Angiography ***(Cham et al.2000)***.

Some studies compared Indirect CT Venography with lower extremity sonography. Results reported sensitivity and specificity of 100% & 97% respectively for Indirect CT Venography.This proves that negative sonographic findings do not exclude pulmonary embolism nor do positive sonographic findings reveal the extent of pulmonary embolism within the thorax ***(Garg et al., 2000)***.

Aim of the work:-

To assess the increase in the thrombo-embolic disease detection by Combined CT Pulmonary Angiography & Indirect CT Venography .

Embolism: is the process of partial or complete obstruction of some part of cardiovascular system by any mass carried with circulation. The transported intravascular mass detached from its site of origin is called an embolus ***(Mohan, 2006)***.

Thrombosis: is the process of formation of a solid mass in the circulation from constituents of flowing blood, the mass itself is called a thrombus, while a blood clot is a mass of coagulated blood formed in vitro (i.e. test tube) ***(Mohan, 2006).***

Effect of thrombi:

- Ischemic injury: decrease or stoppage of a blood flow to a tissue or organ.
- Thrombo-embolism: causes ischemia and subsequent infarction (***Mohan,2006)***.

Sources of emboli: (Fig.16):

Most usual forms of emboli (90%) are the thrombo-emboli i.e. those originating from thrombi or their parts detached from the vessel wall. While other forms of emboli depend on either the matter in the emboli whether solid (like tumor emboli), liquid (like fat globules or bone marrow) or gaseous (like air).Also, it may depend on the presence or absence of infection as emboli could be bland, i.e. sterile or septic i.e. infected ***(Mohan ,2006)***.