

## SCIENTIFIC LETTER

## Short term clinical outcome of acute saddle pulmonary embolism

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Wider application of spiral computed tomography (CT) not only improves diagnosis of acute pulmonary embolism (PE) (fig 1), but also allows for non-invasive visualisation of saddle thromboemboli at the level of the bifurcation of the pulmonary trunk and extending into the main right and the main left pulmonary arteries.<sup>1–3</sup> Such proximal thrombus may be regarded as unstable, “in-transit” embolus, which can fragment spontaneously or secondary to treatment and obstruct multiple, distal pulmonary arteries. It remains unclear whether this may further increase haemodynamic compromise. Also, it is unknown whether saddle PE requires modification of clinical management. We tried to evaluate if saddle thromboembolus affected two week outcome of patients with acute PE.

## METHODS

Saddle PE was documented with spiral CT in 17 patients (10 men, 7 women, mean (SD) age 66 (11) years) out of 289 consecutive patients with tomographically diagnosed PE (5.2%). The saddle PE (S-PE) group was compared to 44 consecutive patients (17 men, 27 women, aged 66 (13) years with central, defined as at least lobar, non-saddle PE (NS-PE) proven by spiral CT. At the time of the diagnosis all patients underwent transthoracic echocardiography for the assessment of right ventricular pressure overload.

All patients included in the present study were managed according to the routine procedures, therefore no approval of the ethics committee was requested. The significance of the differences between the groups was compared using Student's *t* test or Mann U test depending on the character of distribution. Significance of the differences between categorical variables was performed with Pearson  $\chi^2$  with Yates' correction when needed. A probability value of  $p < 0.05$  was considered significant. Data are expressed as mean (SD).

## RESULTS

Patients with or without saddle PE were similar in respect to age and sex and coexisting diseases. Systemic blood pressure did not differentiate S-PE from NS-PE (systolic blood pressure 126 (19) *v* 130 (24) mm Hg; diastolic blood pressure 82 (12) *v* 80 (13) mm Hg, respectively). Echocardiographic parameters indicated comparable degree of right ventricular strain. Ratio of right to left ventricular end diastolic dimensions were similar in S-PE and NS-PE (0.74 (0.23) *v* 0.86 (0.24), non-significant (ns), respectively). Tricuspid valve peak systolic gradient was raised to the same level in patients with or without saddle embolus (52 (15) *v* 50 (13) mm Hg, ns, respectively).

Therapeutic options used in the acute phase included anticoagulation or/and thrombolysis. Anticoagulation was performed with intravenous unfractionated heparin in the dose with the prolongation of activated partial thromboplastin time (aPTT) 2–2.5 times control or subcutaneous low molecular heparin in the dose calculated according to body



Figure 1 Spiral CT scan showing large saddle pulmonary thromboembolus in a 46 year old man successfully treated with anticoagulation.

mass. Thrombolysis consisted of two hours intravenous infusion of 1.5 million units of streptokinase, followed by administration of intravenous heparin. The decision to start thrombolysis was based on the clinical status of a patient assessed by the physician in charge. No specific recommendations regarding management of patients with saddle embolism were available in participating centres. Therefore, detection of saddle PE did not a priori influence the treatment selection. Intravenous anticoagulation was usually continued for 5–7 days and was overlapped and followed by oral anticoagulation with international normalised ratio (INR) of 2.0–2.5. Altogether 12 (20%) of all patients with PE were treated with thrombolysis. The remaining 49 (80%) subjects were anticoagulated only. Thrombolytic treatment tended to be slightly more frequently used in S-PE group than in the NS-PE group—29% (5 patients) and 16% (7 patients), respectively. However, the difference did not reach significance ( $p = 0.1$ ).

During two weeks of follow up 10 (16%) patients died: 9 patients from the NS-PE group and one from S-PE group. Although the death rate tended to be higher in the NS-PE group than in the S-PE group (20% *v* 5.8%), the difference was not significant. Irreversible right ventricular failure caused death in 8 patients, while in 2 others (1 S-PE and 1 NS-PE) recurrent fatal PE was clinically diagnosed. Neither clinical

**Abbreviations:** CT, computed tomography; NS-PE, non-saddle pulmonary embolism; PE, pulmonary embolism; S-PE, saddle pulmonary embolism

nor echocardiographic data differentiated patients who died within the two week follow up period from subjects who survived. No life threatening bleeding complications occurred in the whole group. Interestingly, although the presence of saddle thromboembolus seemed to be less frequent in non-survivors than in survivors (1 patient (10%) *v* 16 patients (31%), the difference was not significant.

## DISCUSSION

Saddle PE previously was mostly diagnosed at necropsy.<sup>4,5</sup> Therefore, it was regarded as one of the most severe forms of PE. Wider application of spiral CT allowed non-invasive visualisation of saddle thromboemboli lodged between the main right and left pulmonary arteries.<sup>1,2</sup> However, whether such a finding should modify management still remains unknown. It has been suggested that saddle PE should be urgently treated surgically.<sup>6</sup> However, other authors have reported successful recovery following less aggressive treatment comprising intravenous thrombolysis or even routine anticoagulation.<sup>1,2</sup> It was even suggested that capture of a large thromboembolus at the level of bifurcation of the main pulmonary artery might provide protection from complete obstruction of the pulmonary arteries and therefore prevent sudden death.<sup>5</sup> On the other hand percutaneous emergency treatment using a pigtail rotation catheter, which aided disruption and distal migration of fragmented central thrombi, has been recently reported as proving haemodynamically beneficial.<sup>7</sup> Saddle PE in our material was diagnosed in 17 (5.2%) cases of 289 patients with acute PE confirmed by spiral CT. We found no differences in the initial clinical and echocardiographic parameters between patients with saddle and non-saddle central PE. During the two week follow up 10 of 61 patients died. This included 1 patient with and 9 without saddle thromboembolus. Survival rate tended to be non-significantly higher in the S-PE group than in NS-PE group: 16/17 patients (94.2%) *v* 35/44 patients (80%), respectively. This suggests that saddle thromboembolus lodged in the right main and left main pulmonary arteries does not seem to be a risk factor in acute PE.

This report is an observational, retrospective study. Patients were not randomised to thrombolysis or anticoagulation. However, the clinical condition and the rate of thrombolytic treatment were similar in patients with central pulmonary embolism with or without saddle thromboembolus. Our data suggest that saddle thromboembolus present in 5.2% of cases with PE should not directly influence the management.

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## REFERENCES

- Torbicki A**, Pacho R, Jedrusik P, *et al.* Noninvasive diagnosis and treatment of a saddle pulmonary embolism. A case report in support of new trends in management of pulmonary embolism. *Chest* 1996;**109**:1124–6.
- Mabee SW**, Mabee CL, Pacht ER. Normal arterial blood gas in a patient with saddle pulmonary artery embolus: diagnosis by transesophageal echocardiography. *J Nhl Med Assoc* 1995;**87**:717–9.
- Pruszczyk P**, Torbicki A, Pacho R, *et al.* Noninvasive diagnosis of suspected severe pulmonary embolism: transesophageal echocardiography vs spiral CT. *Chest* 1997;**112**:722–8.
- DiSiena MR**, Intres R, Carter DJ. Factor V Leiden and pulmonary embolism in a young woman taking an oral contraceptive. *Am J Forensic Med Pathol* 1998;**19**:362–7.
- Morpurgo M**, Marzegalli M, Morpurgo M, eds. *Pulmonary embolism*. New York: Marcel Dekker Inc. 1994: 11, 113–15.
- Shih WJ**, Robinson MC, Huber C, *et al.* Tc-99m MAA lung perfusion scintigraphy performed before and after pulmonary embolectomy for saddle-type pulmonary embolism. *Clin Nuclear Med* 1995;**20**:128–31.
- Schmitz-Rode T**, Janssens U, Duda SH, *et al.* Massive pulmonary embolism: percutaneous emergency treatment by pigtail rotation catheter. *J Am Coll Cardiol* 2000;**36**:375–80.

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