Surgical embolectomy for intermediate-risk acute pulmonary embolism

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Abstract
Recent series reported excellent results of surgical embolectomy in patients with acute pulmonary embolism with mortality rates of about 5–9% (range 0–13%). However, very low mortality of patients receiving medical treatment for intermediate-risk pulmonary embolism (1.5 and 2.8% at 7 and 30 days, respectively) was recently reported. Thus, we would like to challenge the indication for surgical embolectomy in the subset of intermediate-risk patients.

Keywords: Pulmonary embolism • Thrombosis • Right ventricle • Cardiopulmonary bypass • Surgery

Pulmonary embolism (PE) is roughly associated with a mortality rate of ~15%. Patients with hypotension (systolic blood pressure <90 mmHg for more than 15 min), shock or cardiac arrest are at an even higher risk of recurrent embolism and death. They need urgent treatment with systemic fibrinolysis, or embolectomy (either surgically or with a catheter, the latter sharing the indications for the former) if the former is failed or contraindicated, or if death is likely to occur before fibrinolysis can take effect (a few hours) in order to provide a faster treatment (immediate mechanical clot removal). Sometimes, surgical embolectomy is preferred and may be associated with improved outcome [1, 2]. A number of recent studies have reported excellent results of surgical embolectomy with mortality rates of about 5–9% (range 0–13%) in a heterogeneous population, sometimes including extracorporeal life support [1–5]. These features compared favourably with the previously published mortality (15%) in such intermediate-risk patients with alias sub-massive PE. Thus, the role of surgical embolectomy in this setting has been debated. Vohra et al. have mentioned the possibility of a randomized controlled trial (RCT) to compare fibrinolysis with embolectomy [5, 6]. However, precise subsets of PE patients have to be selected. In an accompanying editorial, Masroor suggested limiting surgical embolectomy to intermediate-risk patients without haemodynamic dysfunction but with right ventricular dysfunction (RVD), a clinical subset in which a trial is proposed by some authors, but we disagree [6, 7].

Definitely, after the publication of the PEITHO trial, isolated RVD (associated with troponin elevation) is no longer a criterion for surgical embolectomy [8]. In the control arm, low molecular-weight heparin, close monitoring and rescue fibrinolysis when needed (in only 17 of 500 patients) achieved an impressively low mortality rate (1.8 and 3.2% at 7 and 30 days, respectively). A single-bolus injection of tenecteplase (full dose) was associated with reduced haemodynamic decompensation but similar, very low mortality rates (1.2 and 2.4% at 7 and 30 days, respectively). It was offset by an increased bleeding risk (haemorrhagic stroke 2%).

Surgical embolectomy under cardiopulmonary bypass is associated with significant morbidity and ‘minimal’ attending mortality. EuroSCORE has been proved to prognosticate mortality adequately in settings different from coronary bypass surgery. Calculation of EuroSCOREs always indicates a predicted mortality higher than such low mortality rates with medical treatment of intermediate-risk PE. Furthermore, mandatory postoperative protamine is an issue. Moreover, many distal PEs may aggravate patients with chronic respiratory disease, who may thus not be amenable to surgery despite RVD. Accordingly, only patients with proximal PE, the so-called Vanderbilt A, are candidates for acute surgical embolectomy [2]. RVD was mostly diagnosed by right-to-left ventricular end-diastolic diameter >0.9 in the PEITHO study [8]. Some authors advocate elevating this ratio to >1 [7], or >1.5 in order to select for higher risk patients with improved outcome with surgical embolectomy [1]. Raising the PE severity index in addition to RDV, may aid in selecting more severe rather than overall intermediate-risk patients who may require aggressive treatment.

Furthermore, surgery for the treatment of right heart thrombi gave conflicting results. Thus, surgical embolectomy is possibly an effective treatment of PE with failed fibrinolysis (which could worsen the situation in such surgical candidates) and in high-risk patients. An RCT might be designed in that setting of such high-risk patients rather than in intermediate-risk patients with such low mortality rates with medical treatment. Furthermore, long-term results of either fibrinolysis or surgical embolectomy should be evaluated and late pulmonary hypertension may be an additional benchmark of efficacy in future studies.

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REFERENCES


