Based on our excellent experience with thrombo-endarterectomy using intermittent deep hypothermic circulatory arrest in patients suffering from chronic pulmonary embolism, we performed the same technique in acute massive pulmonary embolism [4].

An optimal view deep into the segmental pulmonary arteries is achieved allowing extensive thrombo-embolectomy on both sides during a limited period of circulatory arrest.

In conclusion, we propose intermittent deep hypothermic circulatory arrest as a new and more effective approach for the treatment of acute massive pulmonary embolism in cases in which complete embolectomy was felt to be incomplete.

References


eComment: Acute pulmonary embolism and surgical treatment

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I read with interest the article by Van Putte et al. [1] in which they describe intermittent application of deep hypothermic circulatory arrest for open pulmonary thrombo-embolectomy in acute massive embolism. Massive pulmonary embolism is a life threatening condition and urgent treatment is indicated immediately after confirmation of diagnosis. Open pulmonary embolectomy is in most cases performed in patients with hemodynamic instability or contraindications for thrombolytic or interventional treatment and results are regarding the acceptable severity of illness. Surgical techniques performed are still controversial.

I agree with the authors that deep hypothermic circulatory arrest is an excellent technique in cases of chronic pulmonary embolism, but I think that deep hypothermic circulatory arrest will not be needed in cases of acute pulmonary embolism. Although longitudinal incision of pulmonary artery is in many cases performed [2, 3], like in the present one, I would suggest semicircular incision of the main pulmonary artery just before pulmonary bifurcation. Through this incision and using rigid suction segmental pulmonary arteries can be viewed well, especially from the left side. Viewing from the right side is often compromised and can be facilitated in some cases with additional direct incision of right pulmonary artery at the level of right pulmonary artery trifurcation after dissection of tissue between ascending aorta and superior cava vein. I believe that use of Fogarty catheters should be avoided, due to risk of perforation into fragile lung tissue resulting in intrapulmonary bleeding. In addition, compression of lungs very often reveals mobilized peripheral clots and should be performed carefully.

Two other points of view are very important; first, bicaval cannulation should be done making careful inspection of right atrium, interatrial septum, and right ventricle possible and safe, avoiding recurrent embolism of clots remaining in right heart, and second, reperfusion of the extremely dilated and compromised right ventricle is essential. The technique described by Van Putte and colleagues uses rewarming time for extensive reperfusion.

Fig. 1. (a) Preoperative contrast enhanced CT image of the central pulmonary artery as well as the right and left pulmonary branches. The left pulmonary artery was totally occluded by massive thrombus while the lumen of the left pulmonary artery was severely compromised by thrombus. (b) Postoperative contrast enhanced CT image showing a completely open pulmonary circulation on both sides.

for survival can be achieved by emergency thrombo-embolectomy. At induction, most patients get into circulatory collapse due to the impaired filling of the left ventricle necessitating immediate cardio-pulmonary bypass. Generally, thrombo-embolectomy is performed by using extracorporeal circulation using Fogarty balloon catheters, suction and opening the pleural space to allow for massaging of the lung as a means to dislodge the peripheral emboli [3]. This approach is characterised by a compromised view into the left and right lobar and segmental pulmonary arteries due to retrograde bleeding from the bronchial circulation often resulting in incomplete thrombo-embolectomy. Usually, massive thrombus formation occurs in the segmental arteries after an acute thrombogenic central occlusion.
Anyway, I believe that application of deep hypothermic circulatory arrest during pulmonary embolectomy should be a good option in cases of recurrent pulmonary embolism with fresh and old clots in pulmonary artery tree.

References

