non-heart-beating donation. As you have mentioned in your paper that DCD is not approved in Sweden, neither is it in Hungary, but, interestingly for me, it is in the United Kingdom. It means that we may lose a certain proportion of possible organs in our countries compared to the UK, for example. This fact further emphasizes the great value of your work with EVLP, saving organs which otherwise would be rejected and, at the same time, it might bring up the issue of the need for joint efforts for higher acceptance of non-heart-beating donations in our societies.

Dr Wallinder: I agree with higher what you say. Of course, the field of DCD or NHBD is interesting, and maybe more interesting if we can stretch the indications and do more uncontrolled DCD or NHBD donation, as in Spain, actually.

Dr A. Chapelier (Suresnes, France): Your presentation outlines again today the major interest in EVLP to increase the pool of donors. I have a comment and a question. Following the large experience of the Toronto group reported last May at the AATS, 18 months ago we started a programme of EVLP with the Toronto procedure and reported last month in Paris, at the International Congress on Lung Transplantation, the results of the French clinical experience of 21 initially rejected donors with increased PaO2/FiO2 ratio from a mean of 250 mmHg to nearly 500 after EVLP. Subsequently, double-lung transplantations with good results were done in 20 out of the 21 cases.

My question is related to your three single-lung transplantations you did after EVLP. What were the reasons for doing a single-lung transplantation, and if the second lung was not used for transplantation, did you perform a biopsy before and after EVLP?

Dr Wallinder: The reason for single-lung transplantation in the first case was a big haematoma in one of the lungs, so because of that, we found it unusable. In the second lung, the complete upper lobe was consolidated. Although we tried with PEEP trials and bronchoscopy, we couldn’t mobilize that. On the third occasion, we did an evaluation of a pair of lungs, but the recipient was scheduled for a single-lung transplantation, and because of that, we opted for that alternative. So we had a good lung, but we didn’t use it. Those are the reasons. Was there one more question?

Dr Chapelier: The biopsy.

Dr Wallinder: No, we didn’t do it.

Dr C. Aigner (Vienna, Austria): You mentioned that you are using a blood-based perfusion solution. Do you use donor blood or packed red blood cells?

Dr Wallinder: We use packed red blood cells from the blood bank.

Dr Aigner: When you are using the acellular perfusion solution, I agree that the oxygenated diluted perfusion solutions are certainly not directly comparable to the oxygenation levels you can achieve in the donor; however, the trend can be equally well established in an acellular perfusion solution. So what are your considerations in using the blood-based perfusion instead?

Dr Wallinder: Well, we started with the red blood cells, as we adopted this concept from the group in Lund. As quite recently shown by the Toronto group in a small setup, they induced a shunt in one of the lungs and compared their P/F ratio between perfusate with red blood cells and without red blood cells, and in the acellular group you couldn’t see any difference in the PaO2, whereas in the red-blood-cell-containing group there was quite a remarkable decrease in the P/F ratio. So the red blood cells add something to your evaluation. I think we will continue with that.

Growing experience with ex vivo lung perfusion: many ways leading to the same goal

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Keywords: Lung transplantation • Ex vivo lung perfusion • Lung reconditioning

* Ex vivo lung perfusion (EVLP) has gained enormous interest, and a substantial number of lung transplant centres are using EVLP to increase the donor pool. The most widespread approach currently is the optimization and second evaluation of initially unacceptable donor organs with reversible impairments or donors after circulatory death. In this issue, the Sahlgrenska group presents an update of their experience with 5 additional cases [1] compared with the initial report from 2012 [2]. The results of this paper confirm the satisfying outcome achieved with the use of EVLP lungs. During the additional 10 months reported in this paper, 20% of all transplanted lungs were evaluated with EVLP. This represents a substantial increase in the transplant activity compared with if these lungs had all been otherwise rejected. The 100% acceptance rate after EVLP (with the exception of two single lungs while still using the contralateral side) suggests a careful preselection of EVLP cases.

There are several different technical EVLP solutions available on the market, and there are distinct differences in the way EVLP is performed and in the interpretation of results obtained during EVLP.

To accept a lung after EVLP, the Sahlgrenska group relies on a single measurement of venous pO2 and functional parameters if the initial values are fine. Due to variabilities in gas flow to the deoxygenator and differences in the oxygen content in the inflow, the pO2 difference between the arterial inflow and venous outflow (ΔpO2) is used by the majority of centres to judge oxygenation on EVLP. Using venous pO2 as the main parameter blinds out this potentially valuable additional information and might be insufficient to completely assess the oxygenation capacity; however, no direct comparison between these two parameters has been performed in the clinical setting.

The largest EVLP experience so far has been reported by centres using acellular Steen solution [3–6] with consistent results regarding the recipient outcome. In contrast to this, the Sahlgrenska group advocates the use of red cells in addition to the Steen solution.
solution with a haematocrit of 10–15%. So far, it remains unclear if the initial oxygenation measurements obtained on EVLP directly correspond with the values obtained in the donor. Since absolute oxygen values in an acellular solution are not equal to the values obtained in the donor, the development of functional parameters and oxygenation levels during EVLP are additional major parameters in deciding about the acceptance of a lung. If the addition of red cells enhances the direct comparability to the donor is unclear and the interpretation of a single measurement of the venous pO₂ seems doubtful. If the first measurement is already satisfying and the authors speculate on direct comparability with the donor, there is a high likelihood that the increase in pO₂ is rather due to a full recruitment than a true improvement. In this aspect, EVLP could be seen as a rather time-consuming and sophisticated method for what could have been easily achieved by further optimization in the donor. No detailed figures on the comparability between donor and recipient values are provided in the current paper. Even though the clinical results are convincing, there are still questions remaining on the exact interpretation of the results that might receive answers once higher patient numbers have been recruited.

It is very exciting to see the different ways in which EVLP is developing and to compare the advantageous aspects of individual approaches. EVLP has the potential to completely alter our current practice of organ preservation, serve as a platform for a multitude of therapeutic interventions and improve outcome after lung transplantation.

REFERENCES


