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Session Title : Multi-Organ Transplantation

Overview of lung-liver transplantation; liver transplant surgeon's perspective

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Combined lung and liver transplantation (CLLT) is rare but an established therapy for patients with end-stage lung and liver disease with no treatment options beyond transplantation.(1) The major indications for CLLT are cystic fibrosis, cirrhosis with portopulmonary hypertension, hepatopulmonary fibrosis, alpha-1 antitrypsin deficiency with advanced liver and lung involvement, and sarcoidosis.(2) There are a couple of issues to be discussed about surgical techniques, operative sequence, and organ allocation systems. According to the national policy to allocate organs, the priorities of lung and liver organs are different. Because of organ shortage, it seems like there is no organ allocation priority for combined organ transplantation in many Asian countries. Thus, we had the experience of two cases to perform CLLT with cadaveric lung and living liver graft. In this lecture, my team's experience will be presented to share a liver transplant surgeon's perspective.

1. Technical issue

Respective lung and liver transplant techniques are usually the same as what each center has been doing. Most issues to be brought up could be the sequence of the operation; lung first versus liver first. As the lung is widely considered more sensitive to ischemia than the liver, the usual sequence of CLLT has been lung first. However, this sequence has disadvantages, including the frequent occurrence of primary graft dysfunction of the lung due to coagulopathy, blood loss, transfusion and hemodynamic instability during liver transplant.(1, 3) Grimm et al. examined 10,225 lung transplantation patients, 30.6% of whom received allografts exposed to prolonged ischemia (≥ 6 h), and found that prolonged ischemia did not independently predict 1-year mortality or the development of primary graft failure.(4) Yeung et al. subsequently examined 906 lung transplant patients, 97 of whom underwent transplantation with a total preservation time of 12 h, and found no difference in median hospital and ICU length of stay or primary graft dysfunction grade at 72 h post-transplantation.(5, 6) There have been isolated case reports of liver first CLLT, with anecdotal data suggesting that it may be a non-inferior technique. Recently, as introducing an ex vivo machine perfusion system can extend more time to preserve the lung graft safely, the liver first strategy has more chance to become more popularized. However, ultimately,

the decision-making relies on a case-by-case evaluation of organ-specific disease severity. In case of combining a deceased donor lung and a living donor liver, the transplant teams should discuss the operation process sequence to minimize the ischemia time and total operating time before transplantation and consider the various scenario with or without ECMO application.

2. Organ allocation system issue

Unlike Western countries, many Asian countries have a deceased donor organ shortage, making it hard to match multiple organs to one recipient simultaneously. When patients need both organs, the patients' priority for both liver and lung should be highest than other waiting patients. This situation led us to perform the first CLLT with deceased lung and living liver grafts.(7) As the majority of the candidate for CLLT have a sicker lung condition than liver, lung transplant alone has been considered and tried for those patients as a last resort. In these circumstances, we can consider combining both organs from deceased and living donors.

3. Immunologic benefit

There are several proposed immunologic benefits of CLLT, including the protective effect of the liver allograft against early rejection of the lung allograft and a greater degree of freedom from chronic lung allograft dysfunction. In a retrospective review of the UNOS database, Rana and colleagues showed that rejection rates were significantly lower for patients who underwent liver, including multiorgan, transplants versus patients with only one type of allograft.(2) The immunosuppression regimen is commonly based on the regimen following lung transplantation.

In conclusion, CLLT can be considered feasible surgery for patients with end-stage lung and liver disease and relatively shows good outcomes despite the previously limited studies. Both the lung and liver transplant teams should come to an agreement about the operation sequence and post-operative management.

[References]

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