Pulmonary arterioplasty for the remaining arterial stump of the donor and the arterial cuff of the donor graft in living-donor lobar lung transplantation

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Received 23 April 2012; received in revised form 25 June 2012; accepted 2 July 2012

Abstract
In living-donor lobar lung transplantation (LDLLT), donor surgeries are conducted in ways that ensure proper dissections for both donors and recipients. We report a case of LDLLT, in which pulmonary arterioplasties with autopericardial patch were performed on both a donor and a recipient. Since excision of the lingular branch of the pulmonary artery was carried out far lower than that of the upper segment of the left lower lobe branch, pulmonary arterioplasty was performed to avoid potential stricture of the remaining lingular branch. Also, because of the oblique stump of the graft pulmonary artery, pulmonary arterioplasty with autopericardial patch was required in the recipient.

Keywords: Arterioplasty • Autopericardial patch • Living-donor lobar lung transplantation • Pulmonary artery

INTRODUCTION
Because of severe donor shortage, particularly in Japan, living-donor lobar lung transplantation (LDLLT) has been one of the last resorts used to save critically ill patients with a wide range of pathophysologies [1, 2]. In LDLLT, surgical procedures are carefully conducted to ensure the proper dissection for both donors and recipients. In donors, small branches of pulmonary artery are sometimes unavoidably sacrificed because of their anatomy [3]. However, if such branches are large enough, arterioplasty should be undertaken. On the other hand, in contrast to cadaveric lung transplantation, LDLLT potentially results in vascular anastomotic complications more frequently, since the condition of the graft pulmonary artery can vary according to the anatomy of the donor vessels [4]. We report a case of LDLLT, in which pulmonary arterioplasties with autopericardial patch were performed in both a donor and a recipient.

CASE REPORT
The recipient was a 54-year-old woman with bronchiolitis obliterans, following haematopoietic stem cell transplantation. The donors were her husband, for the right lower lobe, and her sister, for the left lower lobe. Three-dimensional computed tomographic angiography was used for preoperative evaluation and intraoperative viewing of the donors’ vessels, which were acceptable, except for the branches of the left pulmonary artery, where it was seen that the planned dividing line was too oblique (Fig. 1). To avoid potential stricture of the remaining lingular branch of the pulmonary artery, pulmonary arterioplasty with autopericardial patch was performed using continuous 6-0 polypropylene sutures. Additionally, because of the oblique stump of the graft pulmonary artery, pulmonary arterioplasty with autopericardial patch was also required in the recipient (Fig. 2). In effect, the stump of the graft pulmonary artery was modified at the back table with autopericardial patch from the recipient, using continuous 6-0 polypropylene sutures, to ensure an adequate anastomotic cuff. LDLLT was performed with cardiopulmonary bypass of 240 min. The ischaemic times of the right- and left lower lobes were 177 min and 150 min, respectively. Surgery was conducted efficiently and the postoperative course was uneventful. One year after LDLLT the patient is doing well, without any limitations.

DISCUSSION
Despite the challenging procedures, particularly for recipient surgery, successful LDLLT largely depends on donor outcome [4]. Donor lobectomies are carefully conducted to ensure the proper dissection for both donors and recipients. Among the pulmonary structures, pulmonary arteries are the most complex when determining the dividing lines because of the variations in their branching. Small branches of pulmonary artery have to be sacrificed in donors, owing to their anatomy; however, if such branches are large enough, arterioplasty should be performed. As was performed in the present case—when the large lingular
branch or branches needed to be spared — pulmonary arterioplasty should be involved.

In LDLLT, vascular anastomotic complications may arise, since the condition of the graft pulmonary artery can vary according to the anatomy of the donor vessels. Because of the anatomical features of the main pulmonary arteries at the hilum, left pulmonary arterial anastomosis can potentially involve vascular anastomotic complications [4, 5]. Thus, in the reported case, because of the oblique stump of the pulmonary artery of the left graft, we performed pulmonary arterioplasty with autopericardial graft, to avoid potential pulmonary arterial anastomotic complications. In modifying the stump of the graft pulmonary artery with autopericardial patch at the back table, we aimed to create an adequate anastomotic cuff: however, we kept in mind that we should not form too long a left pulmonary artery in the process. An overly-long left pulmonary artery after anastomosis would be more likely to cause a pulmonary arterial kink after reperfusion. In LDLLT, the graft lungs are usually small and, therefore, vascular complications may be lethal.

In conclusion, we herein reported a case of LDLLT, in which pulmonary arterioplasties with autopericardial patch were successfully performed in both a donor and a recipient.

Conflict of interest: none declared.

REFERENCES