TABLE 1. Parameters of the receiver operating characteristic curve after generalized linear modeling

Surgical procedure	Value	95% Confidence interval	P value
Intercept	1.22 ± 0.10	1.04–1.45	<.05
Slope	0.91 ± 0.08	0.78–1.1	<.05
Effect of mitral surgery on intercept	−0.38 ± 0.16	−0.68 to −0.06	<.05
Effect of mitral surgery on slope	−0.36 ± 0.10	−0.57 to −0.15	<.05

Receiver operating characteristic curve is defined by 2 parameters, *intercept* and *slope*. The only covariate significantly affecting the receiver operating characteristic curve parameters was mitral valve surgery, which negatively affected discriminative performance.

intervention, and different surgical procedures are therefore expected to exert different effects on the prediction of in-hospital mortality. The Society of Thoracic Surgeons score was developed from data from distinct surgical populations, and the weight of procedures in risk prediction was underscored and included in the model.[4] In contrast, the recently released euroSCORE II categorizes surgeries in general classes, privileging the role of the number of procedures without differentiating among non-CABG procedures.[1] In this analysis, we have demonstrated that the discriminative performance of euroSCORE II is higher for surgical categories included in the algorithm, such as CABG or surgery for aortic disease, whereas it decreases in other classes. Nonetheless, the only covariate that significantly affects the ROC curve is surgery for mitral disease, which decreases the performance of the score. The discriminative power of euroSCORE II significantly worsens when applied to mitral surgery, although it still remains satisfactory (AUC 0.79, 95% CI 0.74-0.84). Previous validation studies have demonstrated good discrimination in the case of both isolated CABG and aortic valve replacement, although no composite evaluation of all surgical subgroups has been performed.[5,6]

The identification of independent predictors of discriminatory accuracy should lead to covariate adjustment or to the incorporation of such factors in the score algorithm. Nonetheless, further studies from larger data sets are needed to focus in addition on the roles of diverse surgical techniques for the same disease, because the classification of surgeries that we tested is generic. The general category "surgery for mitral disease," and also other surgical categories, includes different treatment options that can have an effect on outcomes.

The more complex categorization introduced in the updated euroSCORE II to update the older versions still seems inadequate. Further testing and refinement of the algorithm should include further surgical categories, and even subcategories.

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Single-lung transplants: The fate of the second donor lung

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Patients listed for lung transplants still suffer from lack of available donor organs. In France between 2004 and 2009, an average of 31 patients yearly died while on the waiting list.[1] Single-lung transplants (SLTs) have the theoretic advantage of increasing access to transplantation by sharing a single donor between 2 recipients who become "twinned." Twinned SLTs (TSLTs) are feasible even in a single center, without impairment of outcome in the second recipient despite longer ischemia.[2] The real benefit of TSLT

TABLE 1. Criteria for lung quality

	Ideal donor	Acceptable donor	Improper donor
Pao_2 (mm Hg)	>300	>300	>300
Defaults	None	1	2
Age (y)	<55	>55	>55
	And	Or	And/or
Mechanical ventilation (h)	<48	>48	>48
	And	Or	And/or
Tracheal secretions	Clean	Stained	Stained
	And	Or	And/or
Chest radiograph	Clear	Abnormal (mild pleural effusion, atelectasis, lung infiltrates, aspiration)	Abnormal (mild pleural effusion, atelectasis, lung infiltrates, aspiration)

has not been studied on a national level as yet. To do so, we studied how often and why the second donor lung had not been transplanted.

MATERIALS AND METHODS

We collected clinical data from all SLTs recorded in the French national registry on solid organ transplantation run by the Agence de Biomédecine between January 1, 1998, and December 31, 2008. We differentiated all TSLTs from SLTs in which the second donor lung was not used.

When the second lung was not listed as implanted, we first recorded the reason indicated in the registry: not offered, considered as poor quality, no appropriate recipient, and team logistics. We next retrospectively estimated quality of donor lungs, thus distinguishing among ideal donors, acceptable donors, and improper donors (Table 1). We also screened for asymmetric quality of the donor lungs.

RESULTS

Lung harvesting from 297 donors led to 387 SLTs. Both lungs were used for 2 different recipients in 90 donors only (180 TSLTs). In the case of the remaining 207 donors, only a single lung was transplanted. In 115 donors (39% of donors, 55% of rejected lungs), the opposite lung was turned down for asymmetric quality. The main causes for asymmetric quality were aspiration and trauma. In 92 donors (31% of donors, 44% of rejected lungs), the second lung could have been used for TSLT or bilateral lung transplant (BLT; Table 2): there were 31 ideal grafts (10%) and 61 acceptable grafts (21%) with only a single flawed parameter (except for Pao_2, which was always >300 mm Hg).

Nonuse of those 92 grafts for TSLT was based on a decision by the coordinator not to offer the graft in 23%, size inadequacy with respect to the recipient in 20%, lack of blood group–matched recipient in 19%, team logistics in 10%, and miscellaneous reasons in 28% (Table 2).

Nonuse of those 92 grafts for BLT was based on a decision by the coordinator not to offer the graft in 33%, size inadequacy with respect to the potential double-lung recipient in 22%, lack of blood group–matched double-lung recipient in 21%, team logistics in 17%, and miscellaneous reasons in 7% (Table 2).

DISCUSSION

During a 10-year period, 92 single-lung grafts (31%) were not used for either TSLT or BLT. Concurrently, a mean of 9 grafts per year were lost, while an average of 31 patients died yearly while on the waiting list. In our evaluation, we applied strict quality criteria as used in the early 2000s. We know that during the course of this experience, selection criteria have become less restrictive and the donor pool has increased. The number of acceptable lungs is thus probably underestimated in this evaluation.

The lack of blood group- or size-matched recipients was the main cause of refusal of otherwise acceptable second

TABLE 2. Schematic overview of single-lung graft proposals between 1998 and 2008

297 single-lung graft donors		
TSLT: 90 donors, 180 twinned SLT recipients	SLT: 207 donors, 207 SLT recipients; single graft transplanted, loss of opposite lung graft	
	115 donors, asymmetric quality of opposite lung, unsuitable for transplant	92 donors, ideal or acceptable opposite lung but discarded for transplant
		Not used for BLT: not offered by organ sharing coordinator (33%); size inadequacy graft/recipient (22%); lack of recipient (21%); lack of logistic support (17%)
		Not used for SLT: not offered by organ-sharing coordinator (23%); size inadequacy graft/recipient (20%); lack of recipient (19%); lack of logistic support (10%)

TSLT, Twinned single-lung transplant; *SLT*, single-lung transplant; *BLT*, bilateral lung transplant.

lungs. In our study, 29 of the 62 acceptable or ideal donors (47%) were taller than 180 cm; only 10 (16%) were shorter than 155 cm. Size inadequacy is a difficult issue; a larger graft can be reduced, but a smaller graft cannot be increased.[3]

The second cause for nonuse was the organ sharing coordinator's decision to offer the opposite lung neither for TSLT nor for BLT. Well-established rules allow the coordinator not to offer the second single lung when no matched recipient is identified on the waiting list or when organization of the second lung harvest will require additional time until acceptance and effective organ retrieval. Nevertheless, because BLT offers best survival to lung transplant recipients,[4] bilateral lung graft offer should be prioritized. When BLT is not feasible, TSLT should be performed whenever possible to avoid spoiling single-lung grafts. In our study, TSLT efficiently used a third of available donor resources, in contrast with some other countries, in which TSLT accounts for fewer than 5% of all lung transplants.[5]

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