Medical community preferences concerning adult living related donor liver transplantation

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SUMMARY
Objectives — To assess acceptance and acceptable estimated mortality levels for right lobe adult-to-adult living related liver transplantation for the medical and allied professions.

Methods — A paper questionnaire was sent to the physicians practicing with the French Graft Agency (Etablissement Français des Greffes) and to all nurses and ancillary staff of the Paul Brousse Hospital Hepatobiliary Center. Responses were received from surgeons: 38/73; internists specialized in hepatology: 44 / 120; nurses: 98/100; health care assistants: 45/86; others: 17/20.

Results — Acceptance of living donor transplantation is above average for all professional categories and indications may be extended including patients with cancer. Acceptable mortality for the donor was 4%, except among internists (0.7%). Currently, the real risk of mortality for the donor (1%) is lower. Acceptable mortality for the recipient was between 15 and 20%.

Conclusions — Acceptance of adult living donor liver transplantation among health care professionals is clearly above average. Thus the psychological involvement of transplantation teams, which is very strong in such situations, should not hamper the development of this type of transplantation.

RÉSUMÉ
Enquête d’opinion des professionnels de santé sur la transplantation hépatique entre adultes à partir d’un donneur familial vivant

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Objectifs — Connaître, dans une communauté médicale et paramédicale, l’appréciation et les valeurs estimées acceptables de la mortalité de la transplantation hépatique entre adultes à partir d’un foie droit d’un donneur vivant apparenté

Méthodes — Un questionnaire sur papier a été adressé aux médecins des équipes de transplantation hépatique adulte agréée par l’Etablissement Français des Greffes ainsi qu’au personnel paramédical d’un service de transplantation hépatique. Trente sept chirurgiens sur les 73 contactés (Groupe A), 44 médecins sur 120 (Groupe B), 98 infirmières sur 100 (Groupe C), 45 aides soignantes sur 86 (Groupe D) et 17 secrétaires sur 20 (Groupe E) ont répondu.

Résultats — L’accord de principe était supérieur à la moyenne dans tous les groupes, ainsi que pour un élargissement des indications en particulier pour le cancer. Le taux de mortalité acceptable pour le donneur était en moyenne de 4 %, sauf pour le groupe B (0,7 %). Ce pourcentage était supérieur au taux réel. Celui du receveur était entre 15 et 20 %.

Conclusions — Le degré d’acceptation de la transplantation hépatique à partir de donneur vivant familial entre adultes est nettement au-dessus de la moyenne, chez les professionnels de santé. L’implémentation psychologique des équipes de transplantation, pourtant très forte dans ces conditions, n’est, donc, pas un frein au développement de cette technique.

Introduction

Organ shortage is one of the factors limiting more widespread use of liver transplantation in France: in 2003, 806 grafts became available and enabled transplantation in 53% of patients on the waiting list (all potential candidates for liver transplantation are probably not registered on the waiting list). This percentage had declined steadily since 1999 [1].

Living related (intra-familial) donor liver transplantation after partial hepatectomy could be a possible solution. Largely developed for parent-to-child transplantation, living related donor liver transplantation between adults is a more complex situation because the hepatectomy must be large enough to ensure a successful procedure but also small enough to avoid the risk of liver failure in the donor. Right hepatectomy is usually preferred. While the first liver transplantation in a patient who survived more than one year was performed in 1967, the first adult-to-child living related liver transplantation took place in
1989 and the first adult-to-adult living related transplantation in 1994 [2]. This delay resulted from the progressive development of organ shortage and from the major objective of limiting risk for the donor. Currently, there are no data available concerning acceptance of adult-to-adult living related liver transplantation and the acceptable level of estimated mortality in the medical community in France. This survey was conducted in 2002 to collect such information among internists and surgeons participating in teams approved for liver transplantation by the French Graft Agency and among allied medical professionals working with liver transplantation teams in France.

**Patients and methods**

An anonymous questionnaire was sent to all physicians (120 internists, 73 surgeons) members of adult liver transplantation teams registered by the French Graft Agency (Etablissement Français des Greffes) and also to all persons involved in allied medical professions (100 nurses, 86 nurses assistants, 20 administrative agents) at the Paul Brousse Hospital hepatobiliary center where 60 adult-to-adult living related donor right liver transplantations had been performed since 2000.

The questionnaire was introduced with a short text:

"The current shortage of brain-dead donor organs is the main factor limiting the development of liver transplantation. For adult recipients, a few French teams have started using adult related living donor transplantation with the right lobe. With this method, a healthy adult donates approximately half of his/her liver to a close relative. The donation requires a major surgical procedure which leaves a permanent scar and raises the risk of serious, potentially life-threatening, complications. We are conducting a survey among people involved with the different liver transplantation teams in France in order to collect information on their opinion concerning this type of transplantation."

The following demographic data was noted: age, gender, profession, duration of involvement with the liver transplantation team. The questionnaire included three items to be scored on a five-point scale (0 = lowest level of acceptability; 5 = highest level of acceptability):

— in your opinion, is liver transplantation from a living adult related donor acceptable?
— do you think this can increase the indications for liver transplantation?
— do you think this could be proposed for potential recipients with cancer?

There were two questions concerning the level of acceptability of donor and recipient mortality:

— what percentage of donor mortality would you consider acceptable for related living liver transplantation?
— what percentage of recipient mortality would you consider acceptable for related living liver transplantation?

There were two questions with a binary answer:

— would you agree to the donation if the donor has small children who could become orphans in the event of complications? yes or no
— who has the final say concerning whether a donation between two members of the same family will or will not occur? the physician or the potential donor?

**Statistical analysis**

Results are expressed as mean ± standard deviation and median by professional activity, age, gender, and duration of involvement with a transplantation team. Comparisons were made with the χ2 test and Student’s test as appropriate. Logistic regression was used for multivariate analysis; dependent continuous variables (acceptance by principle, acceptation with modification of indications, acceptable donor mortality) were transformed into nominal criteria around the mean of all responses.

**Results**

The response rate was 60.5% (242 / 399 questionnaires). Responses were received from 44 physicians involved in adult liver transplantation (37% of those contacted), 38 surgeons (52%), 98 nurses (98%), 45 nurses assistants (52%), and 17 administrative agents (85%).

Demographic data (age, gender, duration of involvement with a liver transplantation team) are presented by health care profession in table I. Mean age of responders was 40.1 ± 10.3 years (median 40 years). Among the 242 responders, 144 were men (61.5%). Mean duration of involvement with a liver transplantation team was 9.1 ± 6.9 years (median 9 years). This population was not however homogeneous. Mean age of physicians and surgeons was significantly higher. There were more women in the allied professions (nurses and nurse’s assistants). On average, physicians and surgeons had been involved in the liver transplantation team for 12 years while the responders practicing allied medical professions had been involved with such teams for 7.5 years.

The principle of donation between adult members of the same family was acceptable to all professional categories: acceptability score = 3.9 ± 1.5 / 5 (median 4). The acceptability score was higher among nurses (4.1 ± 1.2, median 5) and administrative agents (4.3 ± 1.2, median 5) and lower among doctors (3.3 ± 1.7, median 4) (table II). The difference between professional categories was significant. The overall acceptability that related donor transplantation could modify recognized indications for liver transplantations was above average (3.1 ± 1.8, median 4), but was low for surgeons (2.1 ± 2, median 1). Liver transplantations between adults were considered acceptable for recipients with hepatic cancer (2.9 ± 1.6, median 3). There was no significant different by professional category.

The level of acceptable mortality for the donor was 3.1 ± 8.8% (range 0-50%, median 0%). It varied from 0.7% on average for doctors to 7.2% for administrative agents. The difference between professional categories was significant. One hundred fifteen responders (10 surgeons, 15 internists, 62 nurses, 22 nurse’s assistants, 6 administrative agents) indicated 0% as

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**Table I.** — Demographic data of the responders (gender, age, years working with a liver transplantation team) by professional category.

<table>
<thead>
<tr>
<th>Profession</th>
<th>Surgeries N=38</th>
<th>Internists N=44</th>
<th>Nurses N=98</th>
<th>Nurse assistants N=45</th>
<th>Administrative agents N=17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male / female</td>
<td>36 / 2</td>
<td>31 / 13</td>
<td>17 / 81</td>
<td>8 / 37</td>
<td>3 / 14</td>
</tr>
<tr>
<td>Age (year)</td>
<td>47.3 ± 7.1</td>
<td>46.8 ± 8.9</td>
<td>35.9 ± 8.9</td>
<td>38.1 ± 9.4</td>
<td>35 ± 11.8</td>
</tr>
<tr>
<td>Years working</td>
<td>13.6 ± 4.6</td>
<td>11.4 ± 4.8</td>
<td>7.5 ± 7.2</td>
<td>7.7 ± 6.8</td>
<td>6.4 ± 9.5</td>
</tr>
</tbody>
</table>

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the level of acceptable mortality. The level of acceptable mortality for the recipient was 14.8 ± 16.5% (range: 0-100%, median 10%), and varied from 11.5% on average for nurses to 23% for administrative agents. The difference was significant. Acceptability of the principle of an adult donor with young children was low: 28.5% (65/242). There was no significant difference by professional category.

For 30.5% of the surgeons and internists, the final decision for a potential donation should be made by the medical team; for 36.5% by the donor. For the allied professions, the percentages were 4% by the medical team and 22% by donors. The large majority of responders (146/242, 60.5%) considered that the decision could only be made conjointly by the physician and the donor together.

At multivariate analysis, the only variable found to be independently correlated with the principle of acceptability was responder’s age (table III). Acceptability declined with increasing age. Being a surgeon was independently and negatively correlated with acceptability that related donor transplantation could change classical indications. Compared with the average acceptable donor mortality for all responders, independent correlations were a lower level for internists and a higher level for nurses.

### Discussion

This survey provides a partial view of medical community opinions concerning liver transplantation using living related adult donor organs: response rate to the questionnaire was 43% for internists and physicians and 78% for associated health care professions. The internists and surgeons who responded to this questionnaire correspond to a nationwide sample. All of the allied profession responders worked in one center in Paris which has been very active in liver transplantation since 1974. All responders were health care personnel highly involved with liver transplantation teams.

Among health care professionals, the acceptability of this type of liver transplantation is very much above the average. Thus development of this type of transplantation should not be hampered by the psychological involvement of transplantation teams, which is very important in such situations. This leads to an acute awareness of the difficulty in procuring cadaver organs and the fact that living donor transplantation offers a unique opportunity to achieve liver transplantation within a satisfactory delay and under satisfactory conditions. Recognized advantages of living related donor transplantation between adults include [3]:

- shorter time on waiting list,
- earlier treatment, before excessive degradation of liver function,
- shorter period of ischemia, facilitating resumption of graft function.

Most publications concerning living related adult donor liver transplantation in countries with access to cadaver organs report that the best candidate requires an expedited transplant without significant comorbid conditions that could jeopardize the success of the procedure [4] and that cadaver grafts remain the best option. This definition of indications for liver transplantation is thus more restrictive than classical indications for cadaver organ transplantations. It takes into account the comparisons between short- and long-term outcomes in order to better allocate grafts to patients whose condition would potentially yield the best results. Thus patients with hepatocellular carcinoma measuring more than 5 cm on a cirrhotic liver or who have more than three nodules measuring more than 3 cm are not considered as good candidates for transplantation because the five-year survival of such patients is between 25 and 40% [5, 6]. This is however a non-negligible survival rate. It is better than after surgical resection of pancreatic or esophageal cancer where other options are lacking. This emphasizes the particular situation of transplantation of donor organs and the serious impact of organ shortage. At the present time, certain teams advocate transplantation for patients with hepatocellular carcinoma even if this choice would have an impact on organ allocation [7]. A similar reasoning is put forward for patients whose chronic liver disease worsens rapidly: it is well known that the outcome depends on the patient’s status at transplantation and on receiving it on time [8].
Living related donor liver transplantation would enable broader indications without jeopardizing the chances of persons on the waiting list to receive a cadaver organ. It is important to determine just how far indications can go. For example, if a member of the family expresses a very strong opinion in favor of a family organ donation, it must be known whether the expected benefit for the patient counterbalance the risks for the donor. In our survey, the health care professionals were globally in agreement that liver transplantation should be performed for cancer patients and that living donor transplantation affects (broadens) indications for transplantation. Surgeons expressed more reservations, probably reflecting their better perception of the operative risks. Nevertheless, experienced teams which have reached a certain level of expertise should establish limitations on extended indications [9]; for the health care professionals the final decision should be made to a large extent by the medical team. It can be noted that the level of acceptable mortality for the recipient was lower than the real average, which is somewhat in contradiction with the preceding questions.

In fact, the main issue is donor mortality (and morbidity). In the December 2001 report of the European Registry of Liver Transplantation [10], there were 806 living related donor transplantations, i.e. 1.7% of all transplantations (N = 46530). For these 806 transplantations, four donors (0.5%), including 3 of 296 right lobe donors (1%), died during the postoperative period. Even though donor mortality has been zero in several large-scale series [11], the real risk in Europe should be considered to be 0.5% to 1%. This level of risk is lower than what the health care professionals responding to this survey considered acceptable (with the exception of internists). It must be noted however that a large percentage took the unrealistic position of not accepting any risk at all (0%) for the donor. This is emphasized by the low level of acceptance of a donor with small children (65/228, 28.5%). In the United States, nearly all teams consider that 0.1% to 1% is an acceptable risk level and only 5% of teams accept a risk above 1% [12]. It was recently demonstrated [13] that the general public would accept a much higher level of risk than the transplantation teams, both for the donor (median mortality 21%) or the recipient (median mortality 45%). This is particularly notable when the donor wants to make an organ donation to a recipient with little chance of survival: recipient age and/or several comorbid conditions and/or major hepatic tumor.

The debate is still open. Since the donor must be informed of the risks involved, including the risk of failure, what is the ration-

<table>
<thead>
<tr>
<th>Questions</th>
<th>Odds Ratio</th>
<th>95% confidence interval</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accept the principle (compared with average score 2.5 / 5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>age</td>
<td>0.945</td>
<td>[0.898 – 0.996]</td>
<td>0.03</td>
</tr>
<tr>
<td>years with transplantation team</td>
<td>1.032</td>
<td>[0.956 – 1.113]</td>
<td>0.42</td>
</tr>
<tr>
<td>surgeon</td>
<td>0.731</td>
<td>[0.143 – 3.736]</td>
<td>0.71</td>
</tr>
<tr>
<td>internist</td>
<td>0.552</td>
<td>[0.148 – 2.068]</td>
<td>0.38</td>
</tr>
<tr>
<td>nurse</td>
<td>1.992</td>
<td>[0.606 – 6.546]</td>
<td>0.26</td>
</tr>
<tr>
<td>male gender</td>
<td>2.345</td>
<td>[0.761 – 7.228]</td>
<td>0.14</td>
</tr>
<tr>
<td>Accept broader indications (compared with average score 2.5 / 5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>age</td>
<td>0.992</td>
<td>[0.951 – 1.035]</td>
<td>0.70</td>
</tr>
<tr>
<td>Years working with a liver transplantation team</td>
<td>1.015</td>
<td>[0.956 – 1.078]</td>
<td>0.62</td>
</tr>
<tr>
<td>surgeon</td>
<td>0.064</td>
<td>[0.016 – 0.262]</td>
<td>0.0001</td>
</tr>
<tr>
<td>internist</td>
<td>0.148</td>
<td>[0.043 – 0.512]</td>
<td>0.003</td>
</tr>
<tr>
<td>nurse</td>
<td>0.593</td>
<td>[0.226 – 1.555]</td>
<td>0.29</td>
</tr>
<tr>
<td>male gender</td>
<td>3.156</td>
<td>[1.211 – 8.226]</td>
<td>0.02</td>
</tr>
<tr>
<td>Acceptable mortality for donor (compared with average 3.4 % of responses)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>age</td>
<td>0.959</td>
<td>[0.905 – 1.016]</td>
<td>0.15</td>
</tr>
<tr>
<td>Years working with a liver transplantation team</td>
<td>0.973</td>
<td>[0.898 – 1.053]</td>
<td>0.49</td>
</tr>
<tr>
<td>surgeon</td>
<td>0.613</td>
<td>[0.111 – 3.390]</td>
<td>0.57</td>
</tr>
<tr>
<td>internist</td>
<td>0.106</td>
<td>[0.012 – 0.929]</td>
<td>0.04</td>
</tr>
<tr>
<td>nurse</td>
<td>0.224</td>
<td>[0.082 – 0.612]</td>
<td>0.003</td>
</tr>
<tr>
<td>male gender</td>
<td>0.458</td>
<td>[0.138 – 1.522]</td>
<td>0.20</td>
</tr>
</tbody>
</table>
ale for not allowing the donor make the final decision? Medical paternalism? Although the donor’s opinion is fundamental, the transplantation team is best informed to assess the expected benefit and the potential risk in the real situation of the given recipient. As seen in this survey, the opinion expressed by associated health care professionals was similar to that observed in the general public.

REFERENCES