



Long-term health-related quality of life of living liver donors: what should the transplant team know?

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Living-donor liver transplantation (LDLT) has been established as an alternative to deceased donor liver transplantation as a treatment option for patients with end-stage liver disease. Especially in Japan, where the number of deceased donor liver transplants is extremely small compared to Western countries, LDLT still accounts for the majority of liver transplants.

The most important issue in LDLT is the safety of the donor. Although the potential risk of donor hepatectomy is relatively high, there was only one surgery-related death in living liver donors (LLDs) over the past 20 years in Japan. The frequency of morbidities such as bile leakage has also decreased considerably due to improvements in surgical techniques. In addition, laparoscopic donor hepatectomy, which has been introduced in many institutes recently, contributes to the decrease of severe postoperative pain for LLDs. The physical burden of LLDs in the early period after donation has been decreased by such advances in donor surgery. However, health-related quality of life (QOL) of LLDs is affected by the recovery of not only physical aspects, but also psychosocial aspects.

LLDs voluntarily undergo surgery that is not necessary for themselves to donate organs to save recipients with liver disease. LLDs are originally healthy persons, and no medical benefit is derived from donor surgery. Some donors experience considerable physiological and psychosocial changes after donor surgery, which sometimes decrease their long-term health-related QOL. LLDs want to know such information, because it is necessary for donor decision-making. Therefore, transplant teams should be familiar with the changes in donor QOL after donation, and full

information regarding long-term QOL should be provided preoperatively.

There are many reports regarding the health-related QOL of LLDs in both cross-sectional and prospective designs. Donor QOL is generally investigated by a comprehensive self-diagnosis questionnaire called short-form 36 (SF-36), which consists of multiple questions measuring eight health concepts: physical functioning, physical role limits, bodily pain, general health, vitality, social functioning, emotional role limits, and mental health. Despite the fact that LLDs have undergone highly invasive surgery, several studies suggested that the long-term QOL of LLDs measured using SF-36 was the same or better than the general population (1,2). The physical component score (PCS) of SF-36, especially on questions related to pain, decreased in most donors immediately after donor surgery. Then, the score returned to baseline within 6 to 12 months. On the other hand, it has been reported that postoperative mental component summary (MCS) remains stable throughout the procedure. However, not all donors follow such a course. Shen *et al.* from Taiwan reported that donors in the 1- and 2-year groups had poorer QOL related to physical function than did the general population in Taiwan (3). They suggested that the poorer physical function was due to the fact that most donors in their study underwent right hepatectomy, which is physically more burdensome than left hepatectomy. Takada *et al.* from Japan reported that some donors have prolonged symptoms or sequelae, which decrease their mental health or social functioning (4). In their study, age, number of months until recovery to the preoperative health status, hospital visits due to donation-related symptoms, rest

Table 1 Reported risk factors related to lower mental QOL of LLD in the literature

Author, year, country/region	Donor sample size	Instruments	Risk factors for lower mental QOL
Takada, 2012, Japan	578	SF-36	Comorbidities of donor, rest from work related to donation
Fukuda, 2014, Japan	100	SF-36	Pre-donation concerns (self-oriented), time to donation (>4 weeks)
Ladner, 2015, US	374	SF-36	Recipient death, education less than bachelor's degree
Weng, 2019, Taiwan	68	SF-36	Lower education level, higher MELD in recipient, recipient death
Janik, 2019, Poland	101	SF-36, PHQ-9, IPAQ	Female donors
Morooka, 2019, Japan	374	SF-36, LLD-QOL scale	Recipient death

SF-36, short-form 36; PHQ-9, patient health questionnaire 9; IPAQ, international physical activity questionnaire; LLD, living liver donor; QOL, quality of life; MELD, Model for End-Stage Liver Disease.

from work related to donation in the past month, and the existence of two or more comorbidities were significantly associated with decreased QOL scores. Fukuda *et al.* from Japan reported that donors who expressed concerns about their own health before donation had lower social function, mental health, and MCS scores (5). They also reported that donors who had a time of more than 4 weeks from initial explanation to donation had lower vitality and MCS. Janik *et al.* from Poland used the Patient Health Questionnaire 9, which is usually used to diagnose depression, in addition to the SF-36, and reported that 30.6% of donors had evidence of depression after donation, which was prominent in female donors (6).

Some reports showed the relationship between donor QOL and donor education level. Ladner *et al.* reported long-term donor QOL at nine US centers participating in the Adult to Adult Living Donor Liver Transplantation Cohort Study (7). In this study, recipient death within 2 years prior to the survey and education less than bachelor's degree were significant predictors of poor MCS. Similar results were reported by Weng *et al.* from Taiwan (8). They reported that the recovery of MCS in the SF-36 at 1 year after donation was delayed in donors with recipient death and donor low education levels. Patients with higher education can comprehend the extent and consequences of donation more precisely and are therefore better able to cope with surgical trauma.

Morooka *et al.* from Japan used the LLD-QOL scale, which is a specific quantitative assessment of QOL of LLDs, in addition to the SF-36 (9). They also reported that donors whose recipients had died showed lower mental QOL and lower "satisfaction" and greater "lack of understanding of donor health".

Table 1 summarizes the risk factors related to lower mental QOL of LLDs.

Although some donors have medical and psychological problems after donation, as mentioned above, LaPointe Rudow *et al.* from the US reported that, when asked if they are happy to be a donor, most donors reply that they are happy and are willing to become a donor again (10). In order to improve donor health-related QOL in LDLT, it is essential to provide donors with sufficient information, including not only the risk for the donor and recipient, but also the postoperative QOL of donors, and it is important to provide adequate psychosocial support to donors who have a risk of lower MCS.

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