

Review Article

A review of life quality in living donors after liver transplantation

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Abstract: Living-donor liver transplantation (LDLT) has increasingly performed all around the world. However, LDLT donors achieve no medical benefits and are exposed to the risk of complications, and even death. The potential effects of LDLT on donor safety, donor recovery, and post-donation psychological impairment are essential to be better understood. We searched the MEDLINE database to identify articles about the quality of life (QOL) in adults after LDLT donation. Twenty-eight studies with a total of 1944 donors were included in the review. 14 of the 28 studies (50%) had a cross-sectional design, and the remaining half had a prospective design. The Physical Component Score (PCS) decreased immediately after the donation, then returned to the baseline within 6 to 12 months while the Mental Component Score (MCS) remains comparable to that of normative population throughout the procedure. Compared with the left graft (LG) donors, right graft (RG) donors were significantly older, had longer hospital stays and higher rates of postoperative complications, and a higher recipient mortality rate, while there were no difference in the PCS and MCS between the two groups. Our review clearly indicates that the LDLT donors can endure the donation procedure and return to their normal daily life without major problem in the short term. However, to improve the donor selection criteria and ensure the QOL in donors throughout donation procedure, more studies with longer follow up and larger samples are essential and predictors of poor QOL should be identified in study with sufficient response rate and ideal control groups.

Keywords: Living donor, liver transplantation, life quality

Introduction

Liver transplantation (LT) has been widely accepted as the standard treatment for patients with end-stage liver disease and unresectable hepatocellular carcinoma (HCC). As the shortage of the grafts for LT has been severer over years, living-donor liver transplantation (LDLT) has increasingly performed all around the world. The several advantages like reduction of pretransplantation waiting time and a similar overall graft and recipient survival rate compared with deceased donor liver transplantation (DDLTL) promote the development of this approach. Despite these benefits for the recipients, LDLT donors achieve no medical benefits and are exposed to the risk of complications, and even death [4-6]. Therefore, the potential effects of LDLT on donor safety, donor recovery, and post-donation psychological impairment are essential to be better understood.

Several studies have shown that the morbidity of LDLT donors ranges from 8.6% to 59% [5, 7-9], and the overall mortality rate was about 0.2% [5]. Biliary complications including biliary leak and biliary stricture are the most common complication with an incidence of 9% [10]. Some donors may suffer from psychiatric problems though most of them believe that they had benefited from the donation experience [7, 11, 12]. In short, LDLT contribute a lot to the QOL in living donors after transplantation. Though QOL has been accepted and widely used in living kidney transplantation [13-15], there are few reports in LDLT. Accordingly, we aimed to summarize the effects of LDLT on QOL of donors by conducting a review of current literature.

Materials and methods

The publications were identified by searching the Medline database for relevant articles assessing QOL in living donors published before

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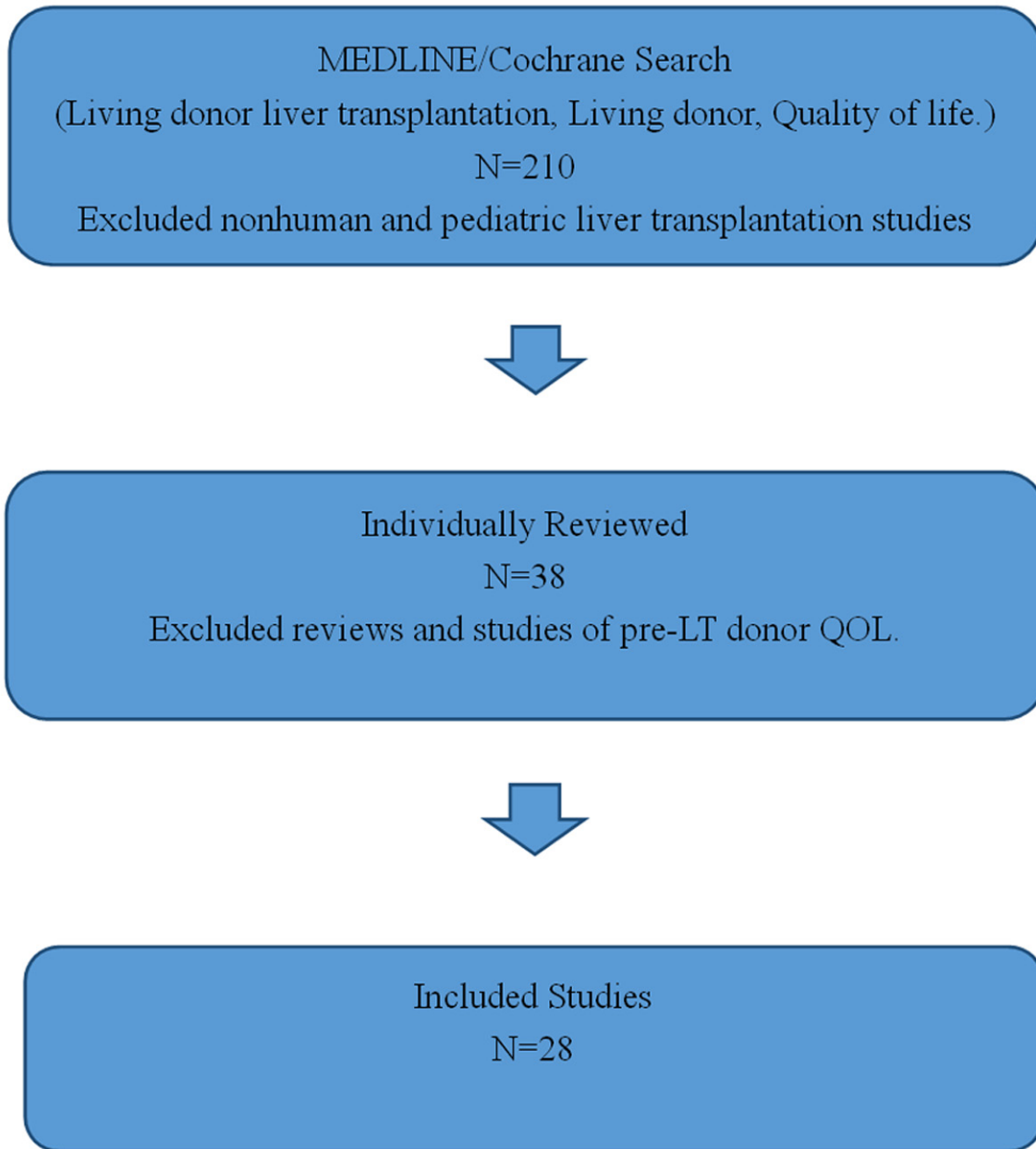


Figure 1. Search strategy.

August 2014. The search was conducted with the following terms: living donor liver transplantation, living donor, quality of life. Relevant papers were also identified from the reference lists of previous papers. No language or date restrictions were used during the search.

Published clinical studies relevant to humans were included while the following types of studies were excluded from our analysis: (1) studies about pediatric liver transplantation; (2) reviews and studies of pre-LT donor QOL.

The Short Form Health Survey (SF-36), one of the most commonly used international standardized measurement tools for quality of life, consists of eight subscales, a total of 36 items, involves two aspects of body health and mental health. The eight health domains include: physical functioning, physical role limits, emotional role limits, vitality, pain, mental health, social function and general health. Each scale is directly transformed into a 0-100 scale on the assumption that each question carries equal weight. The eight subscales are summarized by

the Physical Component Score (PCS) and the Mental Component Score (MCS). To compare with published norms, the raw scores were standardized to have a mean of 50 and a standard deviation of 10.

The World Health Organization Quality of Life BREF (WHOQOL-BREF), derived from data collected using the WHOQOL-100, produces scores for four domains related to quality of life: physical health, psychological, social relationships and environment. WHOQOL-BREF domain scores demonstrated good discriminant validity, content validity, internal consistency and test-retest reliability and widely used in studies that require a brief assessment of quality of life [16]. The Anamnestic Comparative Self-Assessment Scale (ACSA), a psychometric instrument measuring the subjective global QOL, is an anchor scale designed to elicit a 10-stage global assessment of present QOL defined in terms of the best time versus worst time in life [17].

Study findings

As is shown in **Figure 1**, 210 relevant articles were identified using the search strategy: living donor liver transplantation, living donor, quality of life. After careful selection according to our eligibility criteria, 28 published clinical studies with 1944 donors were included in this review.

14 of the 28 studies (50%) had a cross-sectional design, and the remaining half had a prospective design. 21 studies used SF-36 or SF-12 as the instruments to assess QOL in living donors while 7 studies employed other tools like the WHOQOL-BREF and the ACSA (**Table 1**).

All studies included in our view shows that the QOL of donors is similar or even higher than the reference population before donation. The healthy donors, after all, are exposed to the risks of surgical operation and some of them may experience postoperative complications. For example, Lei et al [10] reported the overall morbidity at their center was 25.3% and biliary complications were the most common complication with an incidence of 9%. According to Chan et al [18] donor quality of life dropped most significantly in the first 3 postoperative months, particularly among the physical components and then returned to the previous levels in 6 to 12 months, which is similar to

Verbesy et al.'s study [19]. However, not all the donor follow the similar pattern. Toyoki et al [20] found that PCS scores among those having undergone emergency donor hepatectomy decreased throughout the postdonation periods. These information remind us that it is necessary to identify predictors of poor PCS of donors to improve donors' physical health. Takada et al [12] evaluated 578 donors for a mean postdonation period of 6.8 years and found that age was significantly associated with PCS. Toyoki et al [20] also observed that younger donors and donors without complications had higher PCS scores at 3 months after LDLT. The Adult to Adult Living Donor Liver Transplantation Cohort Study (A2ALL) recently concluded that recipient death within the two years prior to the survey, education less than a bachelor's degree, Hispanic ethnicity, and at the 3 month post-donation time point were the predictors of poor PCS, what's more, low pre-donation PCS scores slightly increased the likelihood of having a low post-donation PCS score [21].

With respect to mental health, differing from the deteriorated PCS, the MCS remains comparable to that of normative population. Psychiatric complications, however, were still reported in several studies. Hsu et al. [22] demonstrate that nearly 40% of the donors reported having one to three metrics of psychological distress. The same as PCS, the predictors of MCS also need to be identified. Both Miyagi et al. [23] and Kim-Schluger et al. [24] reported that donors whose recipients had major complications scored significantly lower on mental and general health scale than those whose recipients had no major complication, but all donors still scored as well as the general population on the mental health scale. Takada et al. [12] and Togashi et al. [25], however, have found contradictory results. The A2ALL also reported that recipient death within the two years prior to the survey and education less than a bachelor's degree were significant predictors of poor MCS [21].

5 of the 28 studies compare right graft (RG) donors with left left graft (LG) donors [9, 12, 26-28]. According to a study of 578 donors by Takada et al. [12] in comparison with 367 LG donors, the 211 RG donors were significantly older, had longer hospital stays and higher rates of postoperative complications, and a higher recipient mortality rate, while the PCS

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Table 1. Characteristics of the included studies

Authors	Year of transplantation	n	Design	Study instruments
Beavers et al. [37]	1996-2000	27	Cross-sectional	SF-12
Trotter et al. [29]	1997-2000	24	Cross-sectional	SF-36
Karlioiva et al. [33]	1998-2000	22	Cross-sectional	SF-36
Kim-Schluger et al. [24]	1998-2000	30	Cross-sectional	SF-36
Pascher et al. [38]	1999-2001	43	Prospective	ACSA
Walter et al. [32]	1999-2000	23	Prospective	ACSA
Basaran et al. [39]	1990-2001	15	Cross-sectional	SF-36
Walter et al. [40]	1999-2001	28	Prospective	WHOQOL-BREF
Parolin et al.[9]	1998-2002	19	Cross-sectional	Interview
Humar et al. [27]	1997-2004	37	Cross-sectional	SF-12
Coelho et al. [8]	1997-2003	37	Prospective	Interview
Miyagi et al. [23]	1991-2003	48	Cross-sectional	SF-36
Verbesey et al. [19]	2001-2004	47	Prospective	SF-36
Chan et al. [18]	2002-2003	30	Prospective	SF-36
Hsu et al. [22]	NA	35	Cross-sectional	WHOQOL-BREF
Erim et al. [34]	NA	123	Prospective	SF-36
Sevmis et al. [7]	2003-2006	46	Cross-sectional	SF-36
Kusakabe et al. [31]	NA	18	Cross-sectional	Interview
Dubay et al. [30]	2000-2007	143	Cross-sectional	SF-36
Schulz et al. [41]	2004-2006	43	Prospective	SF-36
Kousoulas et al. [26]	2002-2009	55	Cross-sectional	SF-36
Togashi et al. [25]	NA	35	Prospective	SF-36
Ishizaki et al. [11]	NA	21	Cross-sectional	SF-36
Takada et al. [12]	1990-2004	578	Prospective	SF-36
Toyoki et al. [20]	1994-2011	41	Prospective	SF-36
Lei et al. [10]	2002-2012	252	Prospective	SF-36
Kawagishi et al. [28]	1991-2010	84	Prospective	SF-36
Kroencke et al. [42]	NA	40	Prospective	SF-36

gnosis of donors. The mean time of full recovery in most donors ranged from 8.5 weeks to 3.8 months [7, 9, 29]. In accordance with Verbesey et al.'s study, the mean time to return to work was 3.4 months, and the average reported out of pocket cost was \$5305.00. Parolin et al. [9] interviewed 19 donors at a median of 13 months after donation found that 32% donors regarded the financial burden as the major problem in the donation process. In our review, about 0%-10% donors reported a decrease in sexual activity [10, 19, 24, 26]. Despite the postoperative complications, financial burden and other problems mentioned above, the majority of donors would donate again if required [7-10, 12, 18-20, 23-25, 27, 29-32].

and MCS were similar in the 2 groups. What's more, Kousoulas et al. [26] studied 55 living donors operated between 2002 and 2009, also found that there was no statistically significant difference observed in any of the SF-36 categories. Kawagishi et al. [28] studied 84 donors included 48 LG donors and 36 RG donors and interestingly demonstrated mental health in the recipient complication group was inferior to the no recipient complication group in the LG period, while no difference were identified between the two groups in the RG period.

Other findings

Most of the reports included in our review have used the general scale of SF-36 to assess living donors' QOL, there were still some researchers, however, focused on specific symptoms which may assist us to deeper understand the pro-

Discussion

According to the 28 studies included in our review, despite the morbidity of LDLT donors ranges from 8.6% to 59% [5, 7-9], the QOL of donors is similar or even higher than the normal population. The PCS decreased immediately after the donation, then returned to the baseline within 6 to 12 months while the MCS remains comparable to that of normative population throughout the procedure. The recipient death within the two years prior to the survey and education less than a bachelor's degree were reported as significant predictors of poor MCS and PCS [21]. As for comparison between RG and LG donors, RG donors were significantly older, had longer hospital stays and higher rates of postoperative complications, and a higher recipient mortality rate, while there were

no difference in the PCS and MCS between the two groups [12].

The QOL in donors were paid more attention to with the increasing number of LDLT by recent years. Relevant literatures, however, were few, especially long-term study. In addition, many of the literatures had the following limitations. On the basis of our review, the donor response rate ranged from 58.0% to 92% [12, 24, 27, 29, 30, 33, 34]. The responders may not represent all donors in that recipients mortality was significantly higher for the non-responders versus the responders [12]. A2ALL recently reported that younger donors, donors had a higher PCS and recipients diagnosis of HCV or HCC predicted lower rates of follow-up [35]. It's imperative to vary the strategies to follow up and gain more information about long-term donor outcomes.

Most studies chose the normative population as the control group, which is debatable because the QOL in donors is similar or even higher than the reference population before or even after donation. Parikh et al. [36] thought potential populations such as donor acquaintance, kidney donors, blood donors, and donors themselves before transplantation can be considered for a comparison. Kroencke et al. suggested that the assessed potential donors, however, were not suitable as a control group with respect to mental QOL and depression because they showed lower QOL scores and higher depression scores before donation. More effort is still needed to be made to find the ideal control group.

Though the SF-36 is one of the most widely used international standardized measurement tools for quality of life, whether some donation-specific factors led to psychological problems after donation is unclear [30]. To identify the risk factors of QOL in donors more accurately, it's optional to conduct standardized pre and post donation assessments by using generic QOL instrument and donor-specific instrument.

Conclusion

In conclusion, our review clearly indicates that the LDLT donors can endure the donation procedure and return to their normal daily life without major problem in the short term. Though there were still some donors reported suffered from the postoperative complications, psychia-

tric problems or even financial burden, most donors believed they benefited from the procedure and would make a second donation if required. However, to ensure the QOL in donors throughout donation procedure and improve the donor selection criteria, more studies with longer follow up and larger samples are essential. Furthermore, predictors of poor QOL should be identified in study with sufficient response rate and ideal control groups.

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Disclosure of conflict of interest

None.

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