Health-related quality of life outcomes after living donor hepatectomy: A brief review

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ABSTRACT

Background: The living donor liver transplantation (LDLT) surgery exposes the healthy donors to the risks associated with a major surgical procedure. The impact that this surgery has on the health-related quality of life (HRQOL) of a donor is an important aspect of outcome. Emerging LDLT centers need to be cognizant of the impact of this major procedure on the donor’s quality of life (QOL). The aim of this review is to summarize the current literature on this aspect of LDLT outcomes.

Methods: Pubmed search was performed and relevant articles were retrieved.

Results: The physical domains of the QOL were significantly worse within first 3 months after surgery but return to baseline at 6 months in the majority of patients. The factors that have consistently been reported to impact the donor QOL include donor age, occurrence of prolonged post-operative complications in the donors, unfavorable recipient outcomes and donation decision made prior to informed consent. The type of allograft does not significantly affect the donor QOL. Despite some degree of financial strain a majority of donors perceived donation as a positive experience with no regrets.

Conclusion: Overall the benefits to the LDLT recipients outweigh the risks to the donors. The post donation care for certain ps of donors at increased risk of poor QOL should continue for years.

Key words: Living donor liver transplantation, Health-related quality of life

INTRODUCTION

Living donor transplantation surgery violates the one of the primary ethical principles of medical practice ‘Primum non nocere’. A healthy donor undergoes a major surgical procedure from which he is not expected to derive any physical benefits. Living donor liver transplantation (LDLT) is a commonly used procedure for end stage liver disease (ESLD). Overall, complications can occur in up to 67% of donors.¹ While most of these complications are transient and minor, a few may be associated with significant morbidity. The mortality rate for living liver donors is reported to be 0.2%². The impact that this surgery has on the health-related quality of life (HRQOL) of a donor is an important aspect of outcome of LDLT surgery, when we consider the utility of living donor transplants. To justify donation the transplant team needs to provide a clear understanding of the risks as well as impact on HRQOL that LDLT will have on the donors. The World Health Organization Quality of Life (WHOQOL) Group defined quality of life (QOL) as individuals’ perceptions of their position in life in various dimensions, implying that it is the subjective evaluation in a cultural, social and environmental context.³ HRQOL refers to a subject’s perceived physical, emotional, and social well-being as impacted by a medical condition its treatment.⁴ The literature on HRQOL in living liver donors is accumulating as living donor liver transplantation has gained acceptance in the last two decades. Emerging LDLT centers need to be cognizant of the impact of this major procedure on the donors’ QOL. In this review, we summarize the current literature on this aspect of LDLT outcomes.

Tools to assess health-related quality of life

Both generic and disease specific instruments have been used for the assessment of QOL in living liver donors. The medical outcomes study 36 item Short Form Health Survey (SF-36) is a generic instrument to measure HRQOL.⁵ It has been validated and is the most popular instruments to assess QOL in the field of transplant surgery. This questionnaire has 36 items to be filled in by responders. These 36 items are yield 8 scales, out of which 3 summary scales, the physical component summary
(PCS), mental component summary (MCS) and the Role/Social Component Score (RCS) are calculated. In contrast to generic instruments, illness specific HRQOL assessment tools can detect impact of specific disease that may not be detectable by generic instruments.²

**Donor morbidity and mortality**

Donation of right or left lobe of the liver for LDLT is not a benign process. In one multi-center survey study based on 11,553 LDLT surgeries, the authors reported an average donor morbidity of 24%.² Liver transplantation to salvage the living donor was required in only 5 cases while the donor mortality rate was 0.2% (23 deaths). Nineteen of these 23 deaths were directly related to surgical intervention. The authors concluded that although the mortality rate of 0.2% was consistent and independent of program experience, increased program experience resulted in lower rates of aborted hepatectomies and near miss events. The most common complications were bile leaks, wound infections, incisional hernias and unplanned surgical explorations. A majority of complications were mild and self-limited (Clavien grade one or two).²

While most of the living liver donors remain in good physical condition postoperatively despite medical complications,⁷,⁸ they do experience decreased quality-of-life.⁹ Castedal et al reported that at more than or equal to 1 year from surgery, 61.8% of the donors were totally free of symptoms. The common continuing problems in the remaining were heartburn, abdominal discomfort, incisional hernia, abdominal muscle weakness and pain in the abdominal scar.¹⁰ Ishizaki et al reported that at a median of 10 months after surgery, 24% of the donors felt wound related physical symptoms and 19% felt anxiety about their future health.¹¹ Another study reported that 15% to 48% of donors endorsed current donation-related physical health problems and concerns, and 7%-60% reported socioeconomic concerns (e.g., insurance difficulties, financial expenditures).¹²

**Trends in donor HRQOL**

Parikh et al reported that based on the Adult-to-Adult Living Donor Liver Transplantation Cohort Study (A2ALL), the donor quality of life prior to donation, was significantly better than the control adult population across all measured QOL domains.¹³ This is probably a reflection of the rigorous evaluation process for the donor selection and that donors who pass the preoperative assessment may be at a slightly overall higher functional level than people in the general population. After donation the donors continue to enjoy a QOL above that of general population. Takada et al reported that the norm based HRQOL scores of living liver donors were better than the scores for Japanese population across all the periods in each year of donation of this study spanning 14 years.¹⁴ Thus the donor HRQOL may transiently trend down in the peri-operative period but it is usually not affected in the long term and remains above general population. A number of factors may influence the HRQOL after living donor hepatectomy and are discussed in the following sections.

**Time after donation**

It is encouraging to note that the donor quality of life improves with the passage of time after donation. It has been reported that the donor quality of life ebbs in first three postoperative months particularly among physical components.¹⁵ The physical and mental components return to the previous levels in 6 to 12 months.⁴,¹⁵,¹⁶ It has been reported that the physical domains of quality of life were significantly worse within first three months but returned to baseline at 6 months in 80-93% of their patients.¹³ Other authors have noticed a slower return to normal physical functions in living liver donors. Jin et al also reported that the donors scored the highest in physical functioning more than two years after donation and lowest when they were within the first year after donation.¹⁷

**Donor age**

Donor age may have a significant impact on their physical and mental quality of life after donation. Takada et al in their cross sectional study on 578 living donors reported that increasing age is significantly associated with decreased HRQOL scores.¹⁴ This observation was supported by Togashi et al who reported that younger donors (<40 years) had higher PCS score at 3 months.¹⁸ On the other hand, Jin et al reported that older donors (>40 years) had a significantly higher score in social functioning and mental health.¹⁷ The fact that though the younger donors score better in physical QOL, the older donors have better mental QOL score may be indicative of mature understanding of outcomes in the older donors.

**Type of living donor liver allograft**

Although it may seem that the quality of life after surgery may be significantly impacted by the type and extent of donor hepatectomy i.e. right lobe versus left lobe for adult LDLT and left lateral segment donation for pediatric LDLT, it has not been proven in most studies. Kousoulas et al reported that the right lobe donors and left lateral segment donors had no significant differences in any of the SF-36 categories.⁹ Xu et al reported significantly higher rates of post-operative complications with right lobe donation compared to left lobe donation however there was no differences in the physical component summary (PCS) and the mental component summary (MCS) between the two groups.¹⁹ Similarly Humar et al reported that although recovery times were somewhat longer with the right lobe donors there was no significant difference in PCS and MCS at 6 months post donation (p=ns) between the right lobe and the left lateral segment donors.²⁰ Other authors have reported similar findings.¹⁴,²¹ Miyagi et al classified 68 donors in 4 groups-lateral segment (n=30), left lobe (n=18), left lobe with MHV (n=1) and right lobe (n=9). There were no significant differences among the 4 groups in all the 8 domains of SF-36.²²

**Post-operative complications**

The severity and duration of post-operative complications could impact the donor quality of life after living donor hepatectomy. Kousoulas et al reported that the donors who developed post-operative complications presented a lower HRQOL compared to donors without complications, where statistically significant differences were found in the categories of role physical, bodily
pain and social functioning. Similarly Toyoki et al reported that the PCS summary declined in the donors that developed post-operative complications. Erim et al demonstrated that the occurrence of severe complications in the donors had a negative correlation with physical and psychiatric quality of life. 

Togashi et al also reported that donors without complications had higher PCS scores at 3 months after surgery but these differences diminished within 6 months after surgery. The MCS scores were not affected by the occurrence of donor complications. The authors attributed this to the fact that the donors were well informed about the possible consequences during the robust evaluation period. Walter et al also reported that the occurrence of donor complications did not significantly affect the QOL of donors after transplantation.

Takada et al reported that the occurrence and severity of post-operative complications were unrelated to long term QOL but donors who reported repeated outpatient visits or required rest due to continued symptoms or prolonged medical complications potentially related to donation showed lower RCS or MCS scores. They concluded that mental and social quality of life deteriorated significantly if the donors were distressed by sequelae of their complications for a long time. Importantly these authors reported that the occurrence of co-morbidities that appeared after donation procedure like diabetes and hypertension (which possibly are age related) are risk factor for reduced QOL. Overall it appears that the occurrence of post-operative complications affects the QOL in the short term but resolution of complications results in good QOL in the long term. However, the stress of prolonged post-operative complication has the potential to affect QOL. It is possible that the detailed and multi-step informed consent process helps the donor to be mentally prepared in case of unfavorable outcomes. The appearance of age related co-morbidities after surgery are probably independent of donation procedure and therefore these donors should be adequately educated pre-operatively.

Recipient health status

It has been shown that the outcomes of the LDLT recipient influence the general health, social functioning and role-emotional of living donors. Post-operative recipient mortality has been reported to correlate with lower mean score in all SF-36 categories. However the statistically significant difference was reached only in the categories of role-emotion and mental health. Recently Ladner et al published long term donor QOL resulting from A2ALL study, which included data from 374 donors up to 11 years after donation. They showed that recipient's death within the two years prior to the survey predicted poor PCS and MCS. However Togashi et al reported that at one-year post donation the QOL in their two donors whose recipients had died was not significantly different from the donors whose recipients had not died. These donors were not included in their study though. Thus even with unfavorable outcomes in the recipient most well informed donors would seem to get back to their baseline QOL with time.

Psychiatric issues

Living liver donors are highly motivated individuals who may conceal their underlying psychopathology that can result in devastating consequences for the donor. The incidence of psychiatric complications after living donor hepatectomy ranges between 4-10%. Kimura et al in their study on post-operative psychiatric complications in living liver donors reported that out of 142 donors with no prior history psychiatric illness a total of 6 (4.2%) donors developed complications. These included major depressive disorder (n=2), panic disorder (n=2), conversion disorder (n=1) and substance abuse disorder (n=2). Three donors achieved remission and 3 required continued treatment but all showed improvement in psychological symptoms and social functions. Similarly Trotter et al reported occurrence of one or more psychiatric complications in 4.1% of their donors (16 out of 392). Among them severe psychiatric complications included suicide, accidental drug overdose and suicide attempt in three donors. Thorough pre-operative psychiatric assessment and post-donation follow up of liver donors is therefore recommended to understand and prevent such tragic events.

Impact of the decision making process

Living donor evaluation for LDLT must ensure that all donors are ‘competent’ to make a decision and that decision to donate is made voluntarily without any external coercion. While donor ambivalence is not considered as a reason for disqualification, most centers will turn down reluctant donors. For the vast majority of donors the decision to donate is an ‘automatic leap’ they make on first hearing of the possibility of living related transplantation, especially in adult-to-pediatric LDLT. This reflects that for the majority of donors the decision to donate is based on emotional process rather than a cognitive information guided process. Narumi et al reported that 35.7% of the donors considered themselves to be the only possibility to save the recipient and the decision to donate was taken before informed consent in 74% of donors. The authors reported that depression and anxiety score was significantly increased among the donors who considered themselves to be the only possibility or those who had decided to donate prior to informed consent. In a comparison of actual versus potential donors (who were excluded during the donor evaluation process), Erim et al reported that the, actual donors had significantly better family support and knowledge about the risks of donation. Karliova et al reported that even though 41% (9/22) of their donors experienced financial difficulties after donation, a majority (92%) would be willing to donate again. The high degree of preoperative information let the donors to have realistic view of operation and potential complications and overall positive retrospective view despite medical, family and financial problems. Experienced teams should be able to recognize donor reluctance and provide assisted donor withdrawal to avoid coercive donations. The donor selection process may be improved by (a) making the donor informed consent a multi-step process with a ‘cooling off period’ after the initial consent, (b) involving a donor advocate, and (c) donor assessment by a dedicated transplant psychologist early on in the evaluation process.
Interpersonal ties

The relationship of donor with liver recipients and recipients’ families either remain unchanged or improve. Most studies report improvement in donor’s relationship with recipient and their families in all cases. More than 70% of the donors report no disruption of family or social relationship because of the donation procedure. Trotter et al reported that 88% of the donors reported that their relationship with the significant other was same or better after donation. One study reported marital strain in 5(33%) of their donors and ultimately divorce in 2. The authors however observed that the marital dissolution for living donors was at a lower rate than the general population. Among those who reported dissolution of marriage, the causes of dissolution were independent of the transplantation procedure and were readily identifiable.

Sexual function

Sexual function and activity may be affected after living liver donation and this may impact the QOL. It has been reported that upto 15% of donors may experience sexual dysfunction. Verbesey et al in their study reported that 49% of the donors had experienced worsened sexual function at one week and/ or 1-month postoperatively. However most donors reported returning to baseline function by 3 months after surgery. At 1-year, 93% reported no change in sexual function while only 4.3% of the donors reported worse sexual function. Another study reported that the 10% of the donors reported impaired sexual function due to decreases libido. Potential donors should therefore be counseled about the low possibility of a transient decline in sexual activity post-donation.

Return to work and financial implications

In countries without universal social health coverage, hospital costs associated with most live donor surgeries are covered by the recipients’ health insurance. However, long-term coverage of the donor for any complications associated with the liver donation along with some other expenses during the donation procedure are not universally covered(transportation, lodging, wages lost etc.). Most donors experience some financial strain that may be prove to be substantial burden for some potential donors with limited resources. Some donors also admit to feeling pressurized to maintain same insurance and thus may be forced to stay in the same job.

Donors should be counselled pre-donation about recovery and return to their occupational activities since this may have an impact on their QOL. Many studies report that up to six months were required for full recovery. Castedal et al from their study which included left lateral segment and the right lobe donors, reported that the sick leave period was 8-12 weeks and most of the donors recovered between 3-6 months. It is encouraging that almost all the donors return to their pre-donation employment status within a few months. Karlsova et al reported an average time to return to work of about 9 weeks while Trotter et al reported the mean duration of 2.4 months before returning to work. It was also pointed that 66% of the donors required a mean of 2.8 months of light duty before returning to full scale work. Parikh et al reported that at 3 months 33% of the donors had returned to work and at 12 months 91% returned to work. A majority of the donors perceived donation as a positive experience with no regrets. Based on the overall donation experience 90-100% of donors admit to undergo the procedure again if feasible.

Other risk factors

Other risk factors that impact donor HRQOL have been reported by different authors. These include pre-donation self-oriented perception, bachelor’s degree, Hispanic ethnicity, emergency hepatectomy and female sex. Donors with full-time employment score have been observed to have high PCS and MCS scores.

CONCLUSIONS

Living donors represent a healthy sample of the population. Despite the extent of donation surgery the benefits to the recipients outweigh the risks to the donor. The current body of literature on the donor quality of life is indicative of the fact that overall donor HRQOL is not affected by donor hepatectomy. Despite the surgical risks and associated post-operative difficulties, most donors do not regret their decision to donate and view that experience positively.

Assessment of donor quality-of-life should be more vigorous as this can give us clues for interventions to further improve the quality of life outcomes and satisfaction level with this procedure. This data generated will be invaluable for tailoring evaluation protocols and further identifying donor risk groups. Certain groups of donors at increased risk of poor QOL could benefit from focused and structured follow up support. To improve the QOL of such donors the post donation care of these groups should continue for years. The fact that QOL is not affected despite complications, if the donors have comprehensive information before they decide to donate, should encourage the transplant community to promote living donor liver transplantation for recipients with end stage liver disease.

REFERENCES


