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CASE REPORT

Postoperative neutrophil-to-lymphocyte ratio of living-donor liver transplant: Association with graft size

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Summary Issues related to small-for-size grafts in living donor liver transplantation (LDLT) are highly important. The neutrophil lymphocyte ratio (NLR) has been reported to be an inexpensive index of systemic inflammation for various diseases. We retrospectively evaluated the relationship between NLR and clinical course of 61 adult LDLT recipients in our institute until post-operative day 14. Patients were classified into two groups based on the graft volume divided by standard liver volume, as over 35% of graft volume divided by standard liver volume (GV/SLV) (Group L; $n = 55$) and under 35% of GV/SLV (Group S; $n = 6$). No differences were seen in background of the patients between the two groups. Also, absolute neutrophil, lymphocyte and platelet counts in both the groups showed no significant differences. In contrast, the NLR between the groups differed significantly from post-operative day 3 to 10, being higher in the Group S. In addition, the incidence of prolonged hyperbilirubinemia and small for size graft syndrome differed significantly between the two groups. Therefore, the elevation of post-operative NLR in the smaller graft group reflect suggestive pathophysiology of endothelial injuries that related to small for size graft syndrome in LDLT.

Conflicts of interest: The authors declare no conflicts of interest.

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1. Introduction

Many reports have described issues associated with graft size in living-donor liver transplantation (LDLT).[1,2] Graft size affects the small-for-size (SFS) graft syndrome, which is often catastrophic and needs to be avoided.[3] The principal pathogenesis of the SFS syndrome is thought to be excessively increased portal flow and the subsequent induction of graft sinusoidal endothelial injury.[2] However, the symptoms of the SFS syndrome cannot be completely avoided, even when an appropriate ratio of graft size to portal inflow is obtained. Therefore, a greater understanding of the underlying pathophysiology is important for overcoming the SFS syndrome.

Complete blood count is an inexpensive and indispensable test following major surgeries, including LDLT. Thus far, the platelet count and its time-serial changes have been the focus of attention, given its reported relationship with postoperative morbidity and mortality.[4] Similarly, the neutrophil-to-lymphocyte ratio (NLR) is an inexpensive index of systemic inflammation.[5] Preoperative NLR has been investigated as a prognostic factor of hepatocellular carcinoma (HCC) in LDLT recipients.[6] In addition, a relationship between prognosis and NLR has been reported in patients with colorectal, lung, and ovarian cancers, as well as in HCC patients.[7–10] Further, NLR can predict the survival in patients of acute coronary syndrome treated by percutaneous coronary intervention and coronary artery bypass grafting.[11,12] However, to date, no reports have analyzed the postoperative NLR in LDLT recipients. Here, we describe a retrospective pilot study to evaluate the relationship between NLR and adult SFS grafts, along with an analysis of other clinical factors.

2. Methods

Between January 1999 and December 2013, 61 patients underwent their first adult LDLT at Kanazawa University Hospital, Kanazawa, Japan. These patients were included in the present study after obtaining an approval from the Institutional Review Board of Kanazawa University Hospital. All living donors were evaluated by contrast-enhanced abdominal computed tomography with using three-dimensional image-analyzing system (SYNAPSE VINCENT; Fuji Film, Tokyo, Japan). The results of the computed tomography were used to calculate whole-liver volumetry, liver graft volume, and residual liver in the donor. The standard liver volume was calculated using the formula developed by Urata et al.[13] The actual graft weight of the procured graft was measured on the back table in the operating room and was defined as graft volume (GV). Then, the graft size was evaluated as the GV/standard liver volume (GV/SLV) ratio and the graft-to-recipient body-weight ratio.

The transplant procedures for both donors and recipients have previously been reported.[14] Hepatic arterial reconstruction was performed using a surgical microscopic procedure. Biliary reconstruction was routinely conducted in a duct-to-duct fashion. Portal vein pressure during surgery was not measured, and concomitant splenectomy for inflow modulation was not performed during this period.

After the transplant, the immunosuppressive therapy started with tacrolimus (Prograf; Astellas Pharma, Tokyo, Japan) and corticosteroids. The tacrolimus dose was adjusted to achieve a trough level of 10–15 ng/mL for 2 weeks following the transplant. Thereafter, the target trough level was gradually reduced to approximately 7 ng/mL. The corticosteroids were administered as an initial dose of 2 mg/kg/d, which was tapered gradually. The principle of postoperative managements about the transplant recipient was not differed according to the graft size.

The recorded clinical data, including preoperative general demographics, the model for end-stage liver disease (MELD) score, graft weight, postoperative changes in complete blood count, prothrombin time–international normalized ratio, total bilirubin levels, C-reactive protein, and total amount of drained ascites fluid at postoperative Days (POD) 1, POD 3, POD 5, POD 7, POD 10, and POD 14 were analyzed. NLR was calculated as the absolute neutrophil count divided by the absolute lymphocyte count. The MELD score was calculated with the formula reported by Kamath et al.[15] Further, the occurrence of adverse clinical events and complications, including infections, acute cellular rejection, or relaparotomy, was retrospectively analyzed during the postoperative hospital stay for LDLT. Both pre- and postoperative infectious complications included surgical site infection defined as above Grade IIIa of the Clavien–Dindo classification, clinically treated pneumonia, bacteremia, and other infectious episodes.[16]

Table 1 Baseline characteristics of the recipients, donors, grafts, and operations.

Factors	Group L (n = 55)	Group S (n = 6)	p
Recipient			
Age (y)	52.9 ± 9.7	50.7 ± 8.7	0.58
Male/female	33/22	3/3	0.68
MELD score	19.1 ± 12.3	20.2 ± 3.7	0.83
Indication			0.03
Cholestatic diseases	13	0	
Fulminant hepatic failure	1	1	
HCC	27	0	
Liver cirrhosis	12	5	
Others	2	0	
Donor and graft			
Age (y)	46.5 ± 6.9	40.2 ± 13.0	0.25
Male/female	32/23	4/2	0.70
GV/SLV (%)	48.8 ± 9.9	32.5 ± 2.0	<0.001
GRWR (%)	0.98 ± 0.26	0.62 ± 0.06	<0.01
Left lobe/right lobe/others	38/16/1	4/0/2	0.56
Operation			
Operation time (min)	947 ± 252	1078 ± 233	0.23
Blood loss (mL)	6836 ± 12,023	10,885 ± 9918	0.36

GRWR = graft-to-recipient body-weight ratio; GV/SLV = graft volume divided by standard liver volume; HCC = hepatocellular carcinoma; MELD = model for end-stage liver disease.