



Right Hepatic Lobe Resection and Thrombocytopenia

Abimbola Adike,* Jorge Rakela,* Christopher Czaplicki,** Adyr Moss,*** Elizabeth Carey*

* Division of Gastroenterology and Transplant Hepatology, Mayo Clinic, Arizona, USA.

** Department of Radiology, Mayo Clinic, Arizona, USA.

*** Department of Transplant Surgery, Mayo Clinic, Arizona, USA.

ABSTRACT

Thrombocytopenia has previously been reported after right lobe resection for organ donation. The mechanism(s) of low platelets after right hepatectomy is unclear and several hypotheses have been proposed including a decrease in thrombopoietin, and hepatic insufficiency resulting in relative portal hypertension following hepatic resection. However, there has previously not been any comparison between patients who undergo hepatic resection for neoplasia *vs.* for living organ donation. We compared platelet values in the postoperative period of patients who underwent right hepatectomy for living donation ($n = 93$) to those who underwent hepatectomy for neoplasia ($n = 21$). There was no significant difference in platelet values between the two groups at one month (291.2 ± 100 *vs.* 285.73 ± 159 , $p = \text{NS}$), three months (223.8 ± 61 *vs.* 185.27 ± 80 , $p = \text{NS}$) and at 12 months (212 ± 44 *vs.* 191 ± 60 , $p = \text{NS}$). We conclude that thrombocytopenia is not uncommon following hepatic lobe resection, and is unaffected by the indication for hepatectomy.

SHORT OBSERVATION REPORT

Thrombocytopenia is common following donor hepatectomy. It has been previously reported in patients who have undergone right hepatic lobe resection for organ donation. Rudow, *et al.* first reported this observation in 2004 in a retrospective review of 70 living donor patients after right hepatectomy and found five of 22 patients (22%) at one year follow-up with persistent thrombocytopenia.¹ Since then, several other studies have also reported a relationship between thrombocytopenia following right hepatic lobe resection. The Adult-to-Adult Living Donor Liver Transplantation Cohort Study (A2ALL) of 487 living donors in 9 US transplant centers found a significant reduction in platelet count at every time point (1 week, 1 month, 3 months, 1 year and 3 years) compared to pre-donation baseline and this was sustained through three years post-donation.² Kim, *et al.* found a significant inverse relationship between platelet count and spleen volume at six months following donation. Although, six months is a short period to measure long-term consequences, there was no difference in donor safety or postoperative complications following right donor hepatectomy with a median follow-up period of 73 months (range, 9-134 months).³

The etiology of thrombocytopenia following right hepatectomy remains unclear but several theories have been proposed including:

- Decrease in thrombopoietin as a result of an incomplete hepatic regeneration following hepatectomy.
- Inadequate hepatic regeneration resulting in relative portal or hepatic insufficiency which in turn leads to elevated portal pressure; and
- Increased platelet consumption from intrahepatic and splenic congestion.²⁻⁴

In our center, we observed that thrombocytopenia was common following right lobe hepatectomy. Comparison of thrombocytopenia in hepatectomy for neoplasia *vs.* living liver donation has not been previously described. We performed a retrospective review of all patients who underwent right lobe hepatectomy from 2005 - 2015. Thrombocytopenia was defined as a platelet value of less than $150 \times 10^9/\text{L}$. Spleen sizes were measured before and after surgery in the coronal and axial planes, with the largest diameter used. Ultrasound evaluation was used if cross sectional imaging was unavailable. We excluded patients who received chemotherapy ($n = 15$) which may influ-

ence platelet values in the post-hepatectomy period. There were no patients with cirrhosis in either group. We compared platelet values in the postoperative period of patients who underwent right hepatectomy for living donation (n = 93) to those who underwent hepatectomy for neoplasia (n = 21). We used unpaired and paired *t*-tests to compare both groups. Mean age of patients in the neoplasia group was 53 ± 16 , and 57% were females. Mean age of living donors was 37 ± 11 , and 58% were females. Six patients in the neoplasia group had thrombocytopenia, three at 12 months, two at 3 months, and 1 patient that was lost to follow up after the first month. In the living donor group, seven patients had thrombocytopenia at 12 months, seven patients at 3 months and two patients at 1 month. There was no significant difference in platelet values between the two groups at one month (291.2 ± 100 vs. 285.73 ± 159 , $p = \text{NS}$), three months (223.8 ± 61 vs. 185.27 ± 80 , $p = \text{NS}$) and at 12 months (212 ± 44 vs. 191 ± 60 , $p = \text{NS}$). There was a significant difference in pre- and post-hepatectomy spleen sizes in both groups of patients with available data (n = 36), 11.2 ± 1.43 cm vs. 12 ± 2.12 cm, $p = 0.014$ with a median follow up period of 32 days in the living donor group and 335 days in the neoplasia group.

There are several limitations of our study. Not all donors had available data at follow up intervals. In addition, some patients had laboratory tests that were done outside of our transplant center which contributes to the variability in normal range of lab values.

In conclusion, thrombocytopenia is not uncommon following right hepatic lobe resection. Thrombocytopenia

after hepatectomy is unaffected by the indication for resection.

CONFLICT OF INTEREST

The authors have no conflicts of interest.

REFERENCES

1. Rudow DL, Brown RS Jr., Emond JC, Marratta D, Bellemare S, Kinkhabwala M. One-year morbidity after donor right hepatectomy. *Liver Transpl* 2004; 10: 1428-31.
2. Trotter JF, Gillespie BW, Terrault NA, Abecassis MM, Merion RM, Brown RS Jr, Olthoff KM, et al. Laboratory test results after living liver donation in the Adult to Adult Living Donor Liver Transplantation Cohort Study (A2ALL). *Liv Transplant* 2011; 17: 409-17.
3. Kim SJ, Na GH, Choi HJ, You Y, Kim DG. Effect of donor right hepatectomy on splenic volume and platelet count for living donor liver transplantation. *J Gastrointest Surg* 2013; 17: 1576-83.
4. Wang HQ, Yang J, Yang JY, Wang WT, Yan LN. Low immediate postoperative platelet count is associated with hepatic insufficiency after hepatectomy. *World J Gastroenterol* 2014; 20: 11871-7.

Correspondence and reprint request:

Elizabeth Carey, M.D.

Division of Gastroenterology and Hepatology. Mayo Clinic.

5777 E. Mayo Blvd. Phoenix AZ 85054.

Tel.: 480-342-1094. Fax: 480-342-1569

E-mail: carey.elizabeth@mayo.edu