Microsurgical Hepatic Artery Reconstruction Using Ikuta A-II Double Clamp

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Summary: We performed hepatic artery (HA) reconstruction on 24 patients between January 2010 and October 2016. Six of 24 patients used an Ikuta type A-II vascular clamp (A-II group). The mean age was 38.0 years (range, 1–61 years). There was no blood leakage at the anastomosed site in any of the patients. No patients required an additional vascular clamp, and none developed HA thrombosis. Eighteen of 24 patients used a conventional vascular clamp. The mean age was 36.1 years (range, 1–65 years; conventional group). Sixteen of 18 patients required an additional vascular clamp due to blood leakage from the HA. There was no significant difference between the 2 groups in mean age or diameter of the recipient HA. However, there was a significant difference in the proportion of patients who required an additional vascular clamp (n < 0.001). The Ikuta type A-II clamp is an effective vascular clamp for reconstruction of the HA in living donor liver transplantation. (Plast Reconstr Surg Glob Open 2017;5:e1324; doi: 10.1097/GOX.0000000000001324; Published online 16 May 2017.)

METHODS

The subjects in this study were 14 men and 10 women with a mean age of 37 years (range, 1–65 years) who underwent HA reconstruction in Fukushima Medical University between April 2010 and October 2016. HA reconstruction was performed after the transplant surgeon completed hepatic and portal vein reconstruction. All HA reconstructions were performed by the corresponding author. The HA was clamped with a vascular clamp, and anastomosis was then performed. If leakage from the HA was found, additional vascular clamps were used on the outside of the double clamp (Fig. 1). The end-to-end anastomosis was performed using a 7-0 PRONOVA suture (Ethicon, Somerville, N.J.). The anastomosis was started from the posterior wall using continuous suturing, and then the anterior wall was repaired using an interrupted suture (Ethicon, Somerville, N.J.).

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at the anastomosis site was either a conventional metal double vascular clamp or an Ikuta type A-II vascular clamp (Fig. 2). Patients using the conventional metal double vascular clamp (Keisei Medical, Tokyo, Japan) were the conventional group, whereas patients using the Ikuta type A-II clamp (Mizuho Ika, Tokyo, Japan) were the A-II group (Fig. 3). We compared ages, the types of blood vessels that underwent anastomosis, the distribution of the diameter of the recipient HAs, and whether or not there were leaks in both groups (Table 1). The mean ages were compared using a t test. Fisher’s test was used to compare the types of graft and recipient HAs and the incidence of leaks. The Mann-Whitney U-test was used to compare the distribution of the diameters of the recipient HA. A P value of less than 0.05 was considered statistically significant.

RESULTS

The mean age of the A-II group was 38 years (range, 1–61 years). Because there was no leakage, additional clamps were not used for any of the patients. There was no thrombus formation at the HA. The mean age of the conventional group was 36 years (range, 1–65 years). Leakage was found in 16 of 18 patients, and additional clamps were required. Comparison of the 2 groups indicated no significant difference in age, type of HA, or distribution of the diameter of the recipient HAs. However, the incidence of leakage was significantly higher in the conventional group.

DISCUSSION

HA is located deep in the abdominal cavity, and the surgical field is affected by respiration. The reported incidence of HA thrombosis is around 5%. To secure the reconstruction of HA, we have invented new methods us-
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ing posterior wall first continuous suturing and 2-step HA anastomosis. We have conventionally used a double vascular clamp with a metal frame. This clamp is heavier than a single vascular clamp and a plastic double vascular clamp, so the degree to which it is affected by breathing is comparatively low. However, there have been cases in which this vascular clamp has slipped off the HA or leakage of blood has occurred due to insufficient pressure on the HA because the diameter of HA is thicker than other arteries. To deal with these cases, anastomosis has been performed using additional vascular clamps. Inomoto et al. reported that 10 of 12 recipient HAs in LDLT developed fibrosis and stenosis of HA. Chow et al. reported that thrombosis may form when the clamp pressure is too strong. These suggest that it is possible that using additional clamps may damage the inner membrane due to pressure at the site where the clamp is used and may result in the formation of an HA thrombosis. We feel the need for using a new vascular clamp.

The Ikuta type A-II microvascular double clamp was introduced in 1988. This clamp can control blood vessels with diameters of 1–5 mm, and the pressure exerted on the blood vessel can also be adjusted. This clamp has mainly been used in reconstruction for extremities. Although this clamp is very popular, there was no report of HA reconstruction using A-II clamp. In the present study, thrombosis did not cause blood leakage at the anastomosed site in both conventional and Ikuta clamp groups. However, slippage of a vascular clamp and the resultant bleeding during vascular anastomosis, as well as the need to use an additional clamp, are extremely stressful during microsurgery. Although reduced operator fatigue and simplified anastomosis with use of an Ikuta type A-II vascular clamp are not reflected in the data, we consider this clamp to be effective for HA reconstruction. And there is another reason why we feel this clamp is more effective. The conventional vascular clamp we use weighs 0.9 g, whereas the Ikuta type A-II clamp weighs 15 g. It may be less affected by respiratory movement. Further study should be done; our result suggests that Ikuta type A-II clamp may enable an even safer and simpler HA reconstruction.

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