I-4

Comparison of Various Methods of Vessel Ligation: What is the Safest Method?

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Research Purpose: A surgeon's tie ligation has been used as the standard methods in achieving hemostasis during operation. Recently, various hemostatic devices such as metal or plastic clips, ultrasonic coagulating shears, and electrothermal bipolar vessel sealer are widely applied. However, there have been only a few studies to support the effectiveness and security of these new devices. The purpose of this study was to analyze the mechanical, histological, and biochemical differences of vessels sealed with various hemostatic devices.

Materials and Methods: Thirty New Zealand White rabbits were randomly allocated into 5 groups, and short gastric vessles were ligated with Hemo-clip (HC), Hem-o-Lok clip (HL), Harmonic Ace (HA), Ligasure (LS), and tie ligation (TL). These vessels were harvested 3 days after operation and histologically analyzed at the site of ligation (proximal) and 5 mm apart (distal). Perivascular fibrosis was assessed in a score of 0 to 3 according to the severity. Inducible nitric oxide synthase (iNOS) and endothelial nitric oxide synthase (eNOS) RNA expressions were measured quantitatively by real-time PCR at the sites of ligation. Abdominal aorta and inferior vena cava were also harvested and divided with each tools, and bursting pressures were measured.

Results: Overall 91 short gastric vessels were analyzed histollogically. Degree of perivascular fibrosis was not statistically different either proximal (HC: 1.71±0.69; HL: 1.89±0.76; HA: 1.29±0.59; LS: 1.68±0.75; TL: 1.63±0.60, p=0.250) or distal (HC: 1.29±0.47; HL: 1.44±0.51; HA: 1.18±0.39; LS: 1.33±0.59; TL: 1.47±0.70, p=0.381) sites between groups. The mean expression of iNOS were significantly lower in LS group (HC: 388.58±57.34; HL: 294.94±37.61; HA: 304.05±67.52; LS: 189.41±44.49; TL: 322.24±55.35, $p<0.001$), and those of eNOS were also significantly lower in LS group (HC: 3.27±0.49; HL: 3.44±0.92; HA: 2.63±0.78; LS: 1.93±1.63; TL: 3.41±0.53, $p<0.001$). Bursting pressures were measured in 164 arteries (mean outer diameter: 2.58±0.67mm) and 141 veins (mean outer diameter: 3.46±0.91mm). LS group showed significantly lower bursting pressures (mmHg) in arteries (HC: 709.37±317.16; HL: 548.02±277.71; HA: 410.29±265.49; LS: 258.14±194.43; TL: 763.56±273.85, $p<0.001$), and HL group showed significantly lower bursting pressures in veins (HC: 366.10±216.59; HL: 79.84±47.04; HA: 191.64±96.54; LS: 131.22±64.06; TL: 647.41±325.79, $p<0.001$). There were negative relationship between outer diameters and bursting pressures both arteries (rho=−0.505, $p<0.001$) and veins (rho=−0.106, p=0.240).

Conclusions: There were no acute hitological differences between hemostatic devices. However, LS showed lowest iNOS and eNOS expressions, which might be due to thermal injuries of whole vessel wall. There might be no clinical limitations in applying various hemostatic devices at small vessels under physiologic blood pressures. However, clinicians need to be careful in application of LS at larger artery and HL in larger veins.

I-5

The Significance of CA 19-9 for Predicting Survival and Recurrence in Intrahepatic Cholangiocarcinoma Patients Treated with Curative Resection

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Aim: To investigate the significance of carbohydrate antigen 19-9 (CA19-9) levels for predicting survival and recurrence in intrahepatic cholangiocarcinoma treated with curative resection

Methods: we retrospectively reviewed data from 77 intrahepatic cholangiocarcinoma patients treated with surgical resection at NCC between April 2001 and July 2010. CA19-9 levels (pre-, postoperative and recurrent CA19-9) and their decline were analyzed for patient distribution and survival.

Results: Before surgical resection, there were 46 patients who had elevated CA19-9 levels (37～100

U/mL: 19 pts, 100～200 U/mL: 8 pts, 200～500 U/mL: 5 pts, >500 U/mL: 14 pts) and 31 who were within normal range (<37 U/mL). And after operation, there were there were 30 patients who had elevated CA19-9 (37～100 U/mL: 18 pts, 100～200 U/mL: 5 pts, 200～500 U/mL: 2 pts, >500 U/mL: 5 pts) and 47 who were within normal range. of 46 patients who had elevated CA19-9 before surgery, 23 patients were within normal range after operation. There were 13, 7, 1, 2pts who were declined to normal CA19-9 levels in 1 week, 1 month, 2 month, >3 month and 1, 2, 3, 17pts who had <25, 25～50, 50～75, >75% decline rates (pre CA19-9-post CA19-9/pre CA19-9), respectively. In patients with normal preoperative CA19-9, 15 of 31 patients had recurred and there were 3 pts who had elevated CA19-9 levels (37-100 U/mL: 2 pts, >100 U/mL: 1 pts) and 12 who were with in normal range after recurrence. And in patients with elevated preoperative CA19-9, 29 of 46 patients had recurred and there were 21 pts who had elevated CA19-9 levels (37-100 U/mL: 10 pts, >100 U/mL: 11 pts) and 8 who were with in normal range. On survival analysis, the cumulative 1-, 3-, and 5-year survival rates were 72.3, 51.5, and 31.1%, respectively and the median survival time (MST) was 37 months (range, 26.1-47.9 months). preoperative CA19-9 <100 U/mL (MST, 47 vs. 22 months; p=0.008), postoperative CA19-9 <100 U/mL (MST, 44 vs. 6 months; p=0.001), decline rate >50% (MST, 47 vs. 28 months; p=0.018) were the strongest and most favorable prognostic factors. However, each recurrence CA19-9 levels and decline periods (time to reach normal CA19-9 levels) were no significant difference in survival. Moreover, in patients with elevated or normal preoperative CA19-9, there were no significantly difference between elevated recurrence CA19-9 levels and normal levels in clinical or pathological factors.

Conclusion: Preoperative CA19-9 <100 U/mL, postoperative CA19-9 <100 U/mL, decline rate >50% may possibly serve as surrogate marker for good prognosis in resected intrahepatic cholangiocarcinoma. However, recurrence CA19-9 levels can not be reliable marker for predicting patient's recurrence.

I-6

Surgical Outcomes of 230 Resected Hilar Cholangiocarcinoma in a Single Institution

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Research Purpose: There have been few reports of surgical outcomes in hilar cholangiocarcinoma especially focused on the surgical modalities and radicality. We reviewed the surgical experiences of hilar cholangiocarcinoma in a single center focused on surgical modalities, radicality, survival rates and independent prognostic factors.

Materials and Methods: Between 1995 and 2010, 230 patients who underwent surgical resection for hilar cholangiocarcinoma were enrolled. Patient demographics, clinical variables, Bismuth-Corlette types of tumor, radicality according to operation methods as well as survival rates were analyzed.

Results: Patients with a type I or II tumor tended to undergo segmental bile duct resection rather than combined liver resection, and had low R0 resection rates in bile duct resection group (68.2% and 76.1%, respectively, p<0.001). Type IIIA was most common (41.7%), and R0 resection rate was 90.3% in left-sided hepatectomy for type IIIB and 84.4% in right-sided hepatectomy for type IIIA (p=0.256). Median overall and disease-free survival except for the patients of R2 resection and in-hospital mortalities were 45.0 and 22.4 months, respectively. Combined liver resection (p <0.001) and additive caudate lobectomy (p=0.003) could give more R0 resection rate than not performed. Multivariate analysis identified lymph node metastasis (p=0.001), the level of bilirubin >3 mg/dl just before surgery (p=0.003) and positive resection margin (p=0.033) as independent prognostic factors on overall survival.

Conclusions: Curative treatment can be more achieved by performing additive caudate lobectomy during combined liver resection in hilar cholangiocarcinoma. Preoperative hyperbilirubinemia above 3 mg/dL should be resolved for better survival.