

Relationship between Bilirubin Decreasing Rate "b" and Morbidity in Patients with Obstructive Jaundice

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ABSTRACT

In the period from 1970 to 1985, 114 patients on whom secondary operation for obstructive jaundice has been done were surveyed. In order to determine a good clinical indicator for predicting prognosis, we took total bilirubin level and the bilirubin decreasing rate "b". In the relationship between total bilirubin level and morbidity, no significant difference were noted in the groups of total bilirubin level below 4.9mg/dl, at 5.0-9.9mg/dl, and over 10.0mg/dl. While the rate of complication is estimated to be 25% in the good group classified by "b" value, 33.9% in the fair group and 73.5% in the poor group, respectively. Significant difference between morbidity in the good group and the poor ($p < 0.01$), and in the fair and the poor ($p < 0.01$) were noted. Thus we conclude that the bilirubin decreasing rate "b" is much better clinical indicator than total bilirubin level.

For the treatment of obstructive jaundice, bilirubin decrease with percutaneous transhepatic cholangio drainage (PTCD) can be performed, and the treatment has become quite safe. In comparison with other operations on digestive tract, however, the operative mortality and morbidity are still high. In the majority of the complications after operation, the origin has been hepatic insufficiency such as bleeding or gastrointestinal bleeding. The routine liver function tests including the total bilirubin level before operation are not sufficient for the prediction of the prognosis after operation. In the present study, therefore, the relationship between the bilirubin decreasing rate "b" proposed by Shimizu et al¹⁾ and morbidity was examined.

MATERIALS AND METHODS

Out of 194 patients who had obstructive jaundice of the total bilirubin level of over 2.5mg/dl and operation was given during 1970 and 1985,

114 patients on whom operation was given secondarily were made the subjects. However, patients complicated with liver cirrhosis were excluded. The method of biliary decompression was PTCD for 88 patients (77.2%), PTCD plus cholecystostomy for 11 patients (9.6%), and cholecystostomy for 15 patients (13.2%). The diseases included one patient with hepatocellular carcinoma, 35 patients with carcinoma of the common bile duct, 5 patients with carcinoma of the gallbladder, 17 patients with ampullary carcinoma, 46 patients with pancreatic carcinoma, and 9 patients with the biliary tract stone. The incidence of the post-operative complications was 52 (54.4%), and the details is shown in Table 1. The subjects were classified into 3 groups of the malignant resectable group (n=34), malignant unresectable group (n=71), and benign group (n=9). The total bilirubin level immediately before operation was classified into 3 grades of below 4.9mg/dl, 5.0-9.9mg/dl, and over 10.0mg/dl.

And the bilirubin decreasing rate “b” was classified into 3 grades, as shown in Fig. 1, of good ($b < -0.09$), fair ($-0.09 \leq b < -0.05$), and poor ($b \geq -0.05$).

Table 1. Complication after operation

Complication	Case (Rate)
Gastrointestinal bleeding	20 (18%)
Peritonitis, abscess	13 (11%)
Leakage	9 (8%)
Bleeding	4 (4%)
Hepatic failure	4 (4%)
Renal failure	4 (4%)
Cholangitis	3 (3%)
Sepsis	3 (3%)
Pneumonia	3 (3%)
Heart failure	3 (3%)
Others	5 (4%)
Nothing	62 (54%)

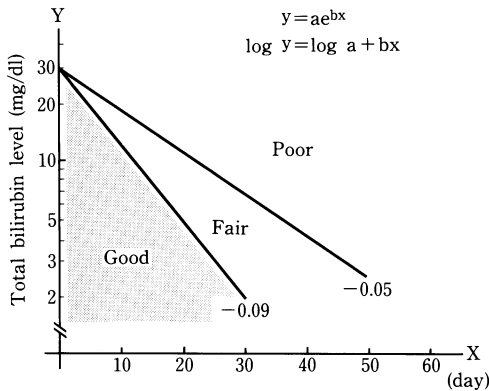


Fig. 1. Classification of the bilirubin decreasing rate “b”

RESULTS

Fig. 2 shows the relationship between the total bilirubin level and the distribution of operative death, survivor with complication, and good course after operation, whereas Table 2 shows

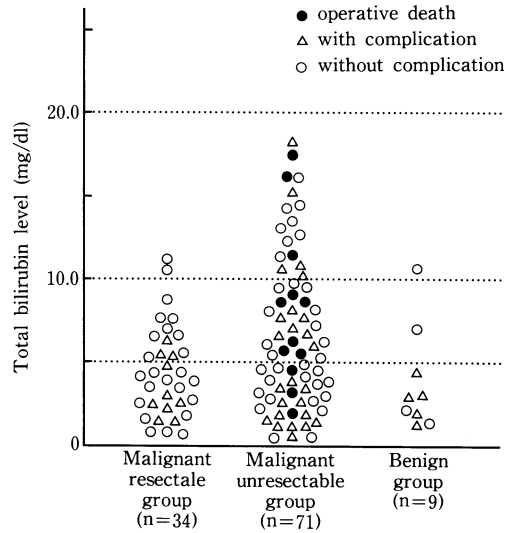


Fig. 2. The relationship between the total bilirubin level and post-operative course

the incidence of complications (operative death plus complications) in each group. There was no difference of the morbidity in each group. The total bilirubin value in 52 patients with complications was 5.4 ± 4.0 mg/dl (mean \pm S.D.), and that in 62 patients without complication was 5.8 ± 4.3 mg/dl, and thus no significant difference was shown.

Fig. 3 shows the similar relationship with the bilirubin decreasing rate “b”, and Table 3 shows the incidence according to the grade. The morbidity indicated high rates in the order of good, fair and poor, and significant difference between that in the good group and the poor ($p < 0.01$), and in the fair and the poor ($p < 0.01$) were noted. The rate “b” in 49 patients with complication was -0.0614 ± 0.0311 , and that in 61 patients without complication was -0.0769 ± 0.0358 , thus showing a significant difference ($p < 0.05$).

Table 2. The relationship between the total bilirubin level and morbidity

Total bilirubin (mg/dl)	Malignant resectable group	Malignant unresectable group	Benign group	Total
-4.9	7/21 (33%)	16/32 (50%)	5/7 (71%)	28/60 (47%)
5.0-9.9	3/11 (27%)	13/23 (57%)	0/1 (0%)	16/35 (46%)
10.0-	0/2 (0%)	8/16 (50%)	0/1 (0%)	8/19 (42%)

Table 3. The relationship between the bilirubin decreasing rate "b" and morbidity

Grade	Malignant resectable group	Malignant unresectable group	Benign group	Total
Good ($b < -0.09$)	1/7 (14%)	3/10 (30%)	1/3 (33%)	5/20 (25%)
Fair ($-0.09 \leq b < -0.05$)	6/21 (29%)	11/31 (35%)	2/4 (50%)	19/56 (34%)
Poor ($-0.05 \leq b$)	3/6 (50%)	20/26 (77%)	2/2 (100%)	25/34 (74%)

p < 0.01 } p < 0.01

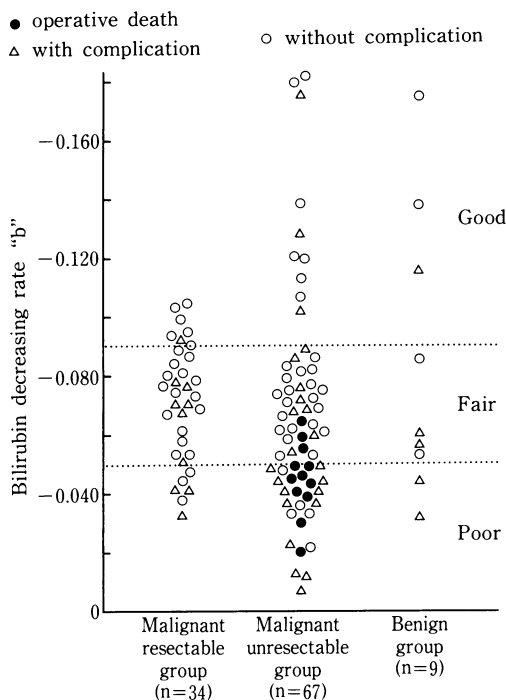


Fig. 3. The relationship between the bilirubin decreasing rate "b" and post-operative course

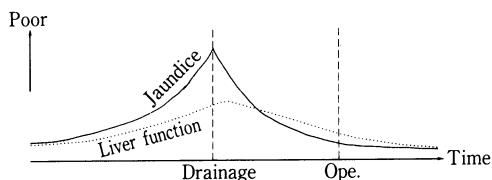


Fig. 4. The relationship between jaundice and actual functional capacity of the liver

DISCUSSION

As the factors influencing on the surgical results of obstructive jaundice, the following 8 points can be cited, although overlapping may be noted in some of them. The points are 1) the age, 2) the period until biliary decompression is started, 3) complications before operation, 4) with or without biliary drainage before operation, 5) whether the biliary drainage is good or

not, 6) the actual functional capacity of the liver immediately before operation, 7) the benign disease or malignant, and 8) the method of operation.

Among these factors, if Factors 5 and 6 are accurately grasped, it may be considered that this will be connected to the improvement of the surgical results. There have been so many reports²⁾ examining the indices of the hepatic functional reserve in obstructive jaundice. Sugawara et al⁵⁾ stated that ATP production capacity and serum mitochondria GOT were useful, while Bonnel et al¹⁾ reported that short-term survival was correlated with preoperative metabolic status as reflected in serum albumin, and blood urea nitrogen (BUN) levels. On the other hand, Ozawa et al³⁾ maintained that the study of the oral glucose tolerance test and immunoreactive insulin were useful. The authors⁶⁾ already studied the relationship between the operative deaths in obstructive jaundice and the liver function tests, and report was presented, and as a result significant differences of the total bilirubin level, cholinesterase, albumin, and prothronbin time between 20 operative deaths and 98 survivors.

In the present study, the total bilirubin level and bilirubin decreasing rate "b" were compared in terms of the biliary drainage among the factors, and it was considered that the "b" value was useful for evaluating the biliary decompression. To sum up all which have been examined so far, the authors presumed that the relationship between jaundice and actual functional capacity of the liver might be as that as shown in Fig. 4. At the time of operation with biliary drainage, there was a discrepancy between the total bilirubin level and hepatic functional reserve, so that the total bilirubin value alone was not made a useful index. On the other hand, although the "b" value is a best index for the evaluation of the biliary drainage, it is insufficient for the index for the hepatic functional

reserve. Accordingly, the authors have been considering the classification by the grade for obstructive jaundice by adding some other index to the "b" value.

REFERENCES

1. **Bonnel, D., Ferrucci, J.T., Muller, P.R. and Lacaine, F.** 1984. Surgical and radiological decompression in malignant biliary obstruction: a retrospective study using multivariate risk factor analysis. *Radiology* **152**: 347-351.
2. **O'connor, M.J.** 1985. Mechanical biliary obstruction, a review of the multisystemic consequences of obstructive jaundice and their impact on peri-operative morbidity and mortality. *Am. Surg.* **51**: 245-251.
3. **Ozawa, K., Takasan, H., Kitamura, O. and Yamaoka, Y.** 1973. Alteration in liver mitochondrial metabolism in a patient with biliary obstruction due to liver carcinoma. *Am. J. Surg.* **126**: 653-657.
4. **Shimizu, T., Yoshida, K. and Muto, T.** 1979. Classification of obstructive jaundice based on the bilirubin decreasing rate "b" and its clinical significance. *J. Jpn. Surg. Soc.* **80**: 93-97.
5. **Sugawara, K., Kawano, N., Mitani, S. and Iwatuki, A.** 1977. Effect of biliary diversion on the pathophysiology of the liver involved in obstructive jaundice. *Jpn. J. Gastroenterol. Surg.* **10**: 736-742.
6. **Tanaka, T., Kodama, M., Seikoh, R. and Takeuchi, H.** 1983. A study of relation between operative mortality and liver function tests in patients with obstructive jaundice. *J. Hiroshima Med. Ass.* **36**: 1399-1401.