

Role of sphincter of Boyden in bile excretion and its regulating factors

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Abstract

AIM: To investigate the role of sphincter of Boyden in bile excretion and its regulating factors.

METHODS: Perfusion manometry, choledocho-cineradiography, reaction of the sphincter of Boyden to endogenous cholecystokinin (CCK) and immunohistochemical quantitative analysis were performed in 16 dogs to study the motility and morphology of the sphincter of Boyden in experimental (postcholecystectomy) group ($n = 8$) and the control group ($n = 8$).

RESULTS: The bile duct surrounded by SB was a low-pressure lumen (10.0 ± 2.0 mmHg), in which the pressure was significantly different ($P < 0.01$, $t = 6.195$) from the basal pressure of the high-

pressure area of sphincter of Oddi (SO), its basal pressure (SOBP) was 16.9 ± 0.5 mmHg. The SB was an enlarged ampulla during bile excretion interval, and showed active contraction during bile excretion. Intrinsic CCK could cause diastole of SO, but does not affect the systole and diastole of SB. After cholecystectomy, spastic contraction persisted in SB, which could not be relieved by intrinsic CCK. The sensitivity to CCK of SO was decreased, and the evacuation time of media prolonged (27.0 ± 3.4 min vs precholecystectomy 17.1 ± 0.9 min, $P < 0.01$, $t = 7.961$). In immunohistochemistry analysis, the contents of α -actin, myosin in the SB of experimental group showed no increase. Under electronic microscope, the main changes were 3D structural disarrangement of the cell framework, distortion of the microfilaments, swelling and aggregation of mitochondria at the nuclear side.

CONCLUSION: The excretion of bile can be divided into two types, physiological bile excretion with a drive mainly caused by the contraction of SB, and the other, functional bile excretion with a drive mainly caused by the contraction of gallbladder. It seems that the function of SB was controlled by vagus, whereas SO was more sensitive to the intrinsic CCK. The intact gallbladder is an elemental factor of functional coordination of SB and SO.

Key words: Bile ducts; Bile; Cholecystokinin; Immunohistochemistry; Oddi's sphincter

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