

# 门奇静脉断流术对胆囊运动功能的影响

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收稿日期: 2004-07-30 接受日期: 2004-08-30

## Effect of portal azygous disconnection on gallbladder motor function

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Received: 2004-07-30 Accepted: 2004-08-30

## Abstract

AIM: To investigate and clarify the effect of vagus on gallbladder motility through a comparative study.

METHODS: Twenty-three hepatocirrhosis patients with portal hypertension were included in this study. In Hassab operation group, the anterior and posterior trunk of vagus were surgically excised ( $H, n = 18$ ); In vena coronaria ventriculi embolization group, the vena coronaria ventriculi bole was ligated and injected TH adhesive (8 mL) after splenectomy (VCE,  $n = 5$ ). Before operation and 10 d after operation,  $^{99m}\text{Tc}$ -labeled diethyl acetyl acid anilide iminodiacetic acid ( $^{99m}\text{Tc}$ -EHIDA, 185 MBq) was administered intravenously to the patients, and then scintigraphic method was used to assess the motor function of gallbladder. The index including radiocounting 30 min after injected  $^{99m}\text{Tc}$ -EHIDA (GBRC 30min), emptying fraction (GBEF), emptying period (GBEP), emptying rate (GBER), latent period (GBLP), latent period radiocounting increment (GBLI) and latent period radiocounting increment rate (GBLR) were analyzed.

RESULTS: GBRC 30 min in H group was significantly lower after operation than that before operation ( $74.8 \pm 66.9$  vs

$155.7 \pm 72.9, P < 0.05$ ); GBLP was very short in pre-operation, and GBLP prolonged significantly after operation ( $13.36 \pm 5.92$  vs  $2.24 \pm 1.48, P < 0.01$ ); the gallbladder radiocounting increased gradually during GBLP; the GBLI and GBLP level were very low before operation, but the GBLI and GBLP increased significantly after operation ( $79.5 \pm 56.3$  vs  $9.2 \pm 11.7, 113.4 \pm 49.5$  vs  $7.6 \pm 10.8, P < 0.01$ ); GBEP shortened significantly after operation ( $18.5 \pm 6.3$  vs  $24.1 \pm 6.4, P < 0.05$ ); GBEF and GBER decreased obviously after operation ( $13.1 \pm 5.4$  vs  $32.3 \pm 16.3, 0.7 \pm 0.3$  vs  $1.4 \pm 0.8, P < 0.01$ ). The preceding parameters in VCE group had no significant difference before and after operation ( $P > 0.05$ ).

CONCLUSION: The gallbladder tension weakens obviously in interdigestive phase after the vagus is excised; the gallbladder contraction delays, and the motor function weakens obviously after meals.

Jin HX, Wu SD, Zhang XF, Chen XY, Zhang GX. Effect of portal azygous disconnection on gallbladder motor function. Shijie Huaren Xiaohua Zazhi 2004;12(11):2655-2659

## 摘要

目的: 利用脾切除、贲门周围血管离断术, 即 Hassab 手术时切断迷走神经, 脾切除、胃冠状静脉栓塞术时保留迷走神经这一特点, 应用放射性核素动态显像的方法, 对比研究两种术式术前术后胆囊运动功能, 为进一步阐明迷走神经在胆囊运动中的作用提供有力依据.

方法: 明确诊断肝硬化门静脉高压症患者 23 例, 其中 Hassab 手术组 18 例, 术中切断迷走神经前后干; 栓塞术组 5 例, 行脾切除后结扎胃冠状静脉并穿刺注射 TH 胶. 全组患者均在术前及术后第 10 d 空腹静脉注射  $^{99m}\text{Tc}$ -EHIDA (二乙基乙酰替苯胺亚氨二醋酸) 动态显像, 0.25 分/帧. 连续 30 min 后食标准脂餐, 再连续动态显像 60 min. 画出胆囊感兴趣区 (ROI), 建立时间放射性曲线, 分析注射  $^{99m}\text{Tc}$ -EHIDA 30 min 后胆囊的放射性计数 (GBRC 30 min)、排胆分数 (GBEF)、排胆期 (GBEP)、排胆率 (GBER)、潜伏期 (GBLP)、潜伏期放射性计数的增量 (GBLI)、潜伏期放射性计数的增加率 (GBLR) 等指标.

结果: Hassab 手术组术后 GBRC 30 min 较术前明显减少 ( $74.8 \pm 66.9$  vs  $155.7 \pm 72.9, P < 0.05$ ); 术前的 GBLP 很短, 术后的 GBLP 却明显延长 ( $13.36 \pm 5.92$  vs  $2.24 \pm 1.48, P < 0.01$ ). 在 GBLP 内胆囊的放射性计数逐渐增加, 但术前的 GBLI 及 GBLR 很小, 而术后的 GBLI 及 GBLR 明显增加 ( $79.5 \pm 56.3$  vs  $9.2 \pm 11.7, 113.4 \pm 49.5$  vs  $7.6 \pm 10.8$ ,

$P < 0.01$ ); 术后 GBEP 明显缩短( $18.5 \pm 6.3$  vs  $24.1 \pm 6.4$ ,  $P < 0.05$ ), GBEF 和 GBER 明显降低( $13.1 \pm 5.4$  vs  $32.3 \pm 16.3$ ,  $0.7 \pm 0.3$  vs  $1.4 \pm 0.8$ ,  $P < 0.01$ ). 栓塞术组各指标术前术后均无显著差异.

结论: 切断迷走神经后消化间期胆囊的张力明显减低, 餐后的胆囊收缩延迟、运动功能明显减弱.

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<http://www.wjgnet.com/1009-3079/12/2655.asp>

## 0 引言

胆囊结石的形成是多种因素共同参与的结果<sup>[1-4]</sup>, 胆囊运动功能异常无疑是其中一个很重要的因素<sup>[5-8]</sup>. 胆囊运动功能受神经和体液等因素的调节<sup>[9-10]</sup>, 迷走神经是调节胆囊运动最重要的因素<sup>[11-13]</sup>. 但由于干扰因素很多且难以控制, 临床研究较少. 目前认为门奇静脉断流术是治疗肝硬化门静脉高压症患者食管胃底静脉曲张破裂出血的有效方法并被广泛应用<sup>[14-15]</sup>. 脾切除、贲门周围血管离断术, 即 Hassab 手术是应用较广泛的断流术. 该手术行脾切除后要离断贲门周围血管, 游离食管下段时为达到更彻底的断流效果需切断迷走神经前后干<sup>[16-18]</sup>. 脾切除、胃冠状静脉栓塞术是行脾切除后在胃冠状静脉起始部注射医用  $\alpha$ - 氰基丙烯酸酯单体(简称 TH 胶), 栓塞贲门周围所有血管达到断流的目的<sup>[19-22]</sup>. 由于该术式不解剖贲门周围组织, 迷走神经得以保留. 我们利用两种不同的术式特点, 应用放射性核素动态显像的方法, 对比研究术前术后胆囊运动功能的变化, 为进一步阐明人迷走神经在胆囊运动中的作用提供有力依据.

## 1 材料和方法

1.1 材料 肝硬化门静脉高压症患者 23 例, 男 13 例, 女 10 例, 平均年龄 51 岁. 有不同程度的脾大、脾功能亢进, 经胃镜检查发现有食管胃底静脉曲张, 经 B 超检查确认均无胆道疾病. 肝功能 Child 分级均为 A 级. Hassab 手术 18 例(男 10 例, 女 8 例), 平均年龄 50 岁, 行 Hassab 手术. 方法为行脾切除后离断及结扎上自贲门上 6 cm, 下至胃大小弯上 1/2 的周围动静脉, 游离食管下段时切断迷走神经前后干. 栓塞术 5 例(男 3 例, 女 2 例), 平均年龄 53 岁, 行脾切除、胃冠状静脉栓塞术. 方法为行脾切除后解剖胃冠状静脉主干, 近根部结扎, 在结扎线的头侧穿刺注射 TH 胶 8 mL. 全组患者术后 48-96 h 排气、进流食, 1 wk 以内排便、进半流食, 术后 10 d 内肝功能均恢复到 Child 分级 A 级.

1.2 方法 全组患者均在术前 3 d 及术后 10 d 空腹  $^{99m}\text{Tc}$ -EHIDA(二乙基乙酰替苯胺亚氨二醋酸) 185 MBq, iv, 0.25 分/帧动态显像. 连续 30 min 后食标准脂餐(Ensure 250 mL 标准冲调液, 含 Ensure 粉 50 g, 热量 1046.0 kJ, 蛋白 14.0%, 脂肪 31.5%, 碳水化合物 54.5%), 再

连续动态显像 60 min. 画出胆囊感兴趣区(ROI), 建立感兴趣区的时间放射性曲线(如图 1AB, 3AB), 并采用以下 7 个指标对曲线进行对比分析: (1)注射  $^{99m}\text{Tc}$ -EHIDA 30 min 后胆囊的放射性(GBRC30 min). (2)排胆分数(GBEF, %): (脂餐后胆囊开始收缩前的最高放射性 - 胆囊收缩至最小放射性)/收缩前最高放射性  $\times 100\%$ . (3)排胆期(GBEP, min): 胆囊开始收缩至不再收缩的时间. (4)排胆率(GBER, %/min): GBEF/GBEP. (5)潜伏期(GBLP, min): 脂餐开始到胆囊开始收缩的时间. (6)潜伏期放射性增量(GBLI): 潜伏期结束时放射性 - 潜伏期开始时放射性. (7)潜伏期放射性增加率(GBLR, %): GBLI/GBRC30 min  $\times 100$ .

统计学处理 各指标术前术后差值经正态性检验, 均符合正态分布( $P > 0.05$ ). 进行术前术后的配对  $t$  检验. 全部统计分析用 SPSS11.0 软件完成, 结果用均值  $\pm$  标准差(mean  $\pm$  SD)表示.

## 2 结果

血中  $^{99m}\text{Tc}$ -EHIDA 迅速被肝细胞摄取, 排泄到胆道, 并进入胆囊储存和浓缩. 注射  $^{99m}\text{Tc}$ -EHIDA 30 min 后, 脂餐前的胆囊的放射性计数能够反映在消化间期同一时间内胆汁流入胆囊的量. 本实验结果显示 Hassab 手术组术后 GBRC30 min 较术前明显减少( $74.8 \pm 66.9$  vs  $155.7 \pm 72.9$ ,  $P < 0.05$ ). 栓塞术组术前术后无明显差异( $P > 0.05$ ). 进脂餐可以引起胆囊收缩, 但都有一定的潜伏期. 本研究显示 Hassab 手术组术前的 GBLP 很短, 术后的 GBLP 却明显延长(min;  $13.4 \pm 5.9$  vs  $2.2 \pm 1.5$ ,  $P < 0.01$ ). 在潜伏期内胆囊的放射性计数逐渐增加, 但术前的 GBLI 及 GBLR 很小, 而术后的 GBLI 及 GBLR 明显增加( $79.5 \pm 56.3$  vs  $9.2 \pm 11.7$ ,  $113.4 \pm 49.5$  vs  $7.6 \pm 10.8$ ,  $P < 0.01$ ). 栓塞术组术前术后 GBLP、GBLI、GBLR 均无显著差异( $P > 0.05$ ). 胆囊的 GBEP、GBEF 及 GBER 是反映餐后胆囊运动功能的重要指标. 本研究发现 Hassab 手术组术后 EP 明显缩短(min;  $18.5 \pm 6.3$  vs  $24.1 \pm 6.4$ ,  $P < 0.05$ ), GBEF 和 GBER 明显降低(%;  $13.1 \pm 5.4$  vs  $32.3 \pm 16.3$ , %/min;  $0.7 \pm 0.3$  vs  $1.4 \pm 0.8$ ,  $P < 0.01$ ). 栓塞术组术前术后 GBEP, GBEF, GBER 均无显著差异( $P > 0.05$ )(表 1, 图 1-3).

## 3 讨论

关于迷走神经在胆囊运动中的作用研究很多<sup>[11-13]</sup>, 但大多限于动物实验, 临床上尚无法很好地证实其结果. 一些学者通过研究胃切除术后患者的胆囊运动功能, 推测人迷走神经在胆囊运动功能的调节中起着重要作用<sup>[24-26]</sup>. 但此法不能排除胃切除及消化道重建等因素的干扰. 1960 年代 Hassab *et al*<sup>[16]</sup>首次行脾切除、贲门周围血管离断术以来, Hassab 手术被广泛应用于治疗门静脉高压的食管胃底静脉曲张. 此后虽然出现很多改良的、联合的手术, 但 Hassab 手术仍作为断流术的基

表 1 Hassab 手术和脾切除、胃冠状静脉栓塞术前胆囊收缩功能比较

指标	Hassab 手术		脾切除、胃冠状静脉栓塞术	
	术前	术后	术前	术后
GBRC 30 min (Bq)	155.7 ± 72.9	74.8 ± 66.9 <sup>a</sup>	124.4 ± 35.3	141.4 ± 63.5
GBLP(min)	2.2 ± 1.5	13.4 ± 5.9 <sup>b</sup>	2.4 ± 1.0	2.4 ± 1.5
GBLI(Bq)	9.2 ± 11.7	79.5 ± 56.3 <sup>b</sup>	8.2 ± 4.6	8.6 ± 4.9
GBLR(%)	7.6 ± 10.8	113.4 ± 49.5 <sup>b</sup>	5.4 ± 4.0	5.5 ± 1.5
GBEP(min)	24.1 ± 6.4	18.5 ± 6.3 <sup>a</sup>	25.9 ± 4.7	23.5 ± 6.4
GBEF(%)	32.3 ± 16.3	13.1 ± 5.4 <sup>a</sup>	39.8 ± 17.0	41.2 ± 28.7
GBER(%/min)	1.4 ± 0.8	0.7 ± 0.3 <sup>a</sup>	1.5 ± 0.7	2.2 ± 2.4

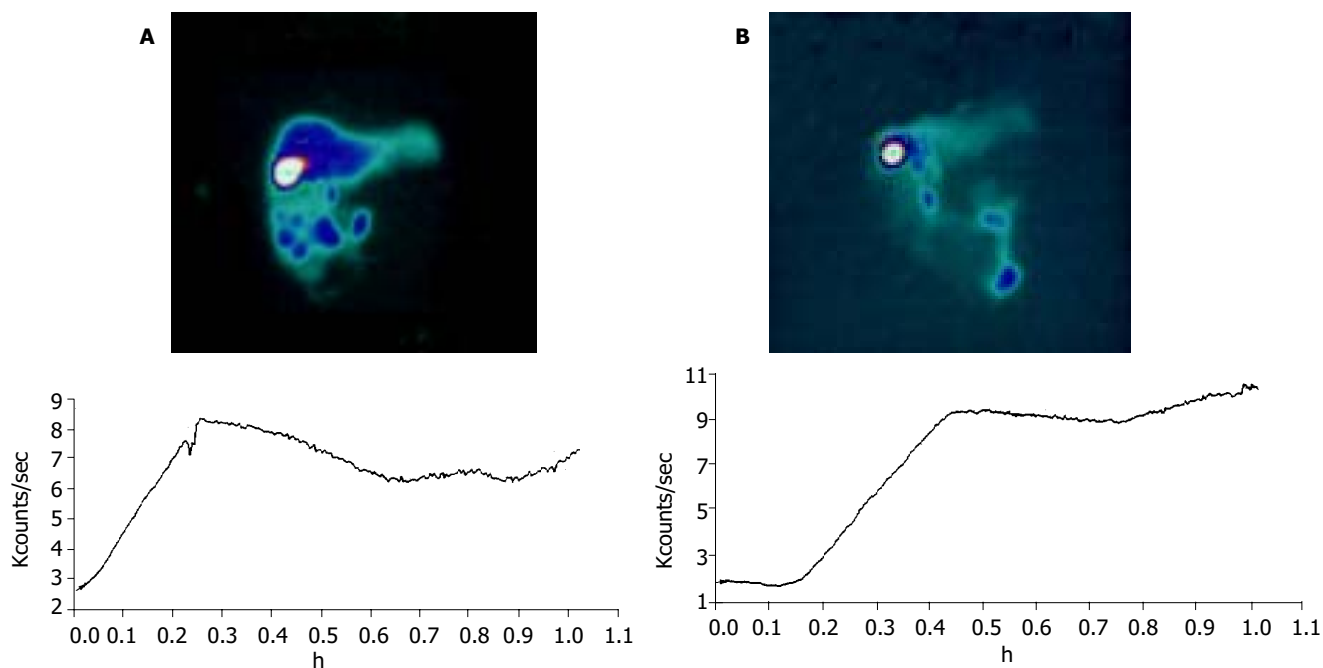
<sup>a</sup> $P < 0.05$ , <sup>b</sup> $P < 0.01$  vs 术前.

图 1 Hassab 手术对胆囊时间放射性曲线的影响. A:手术前; B:手术后.

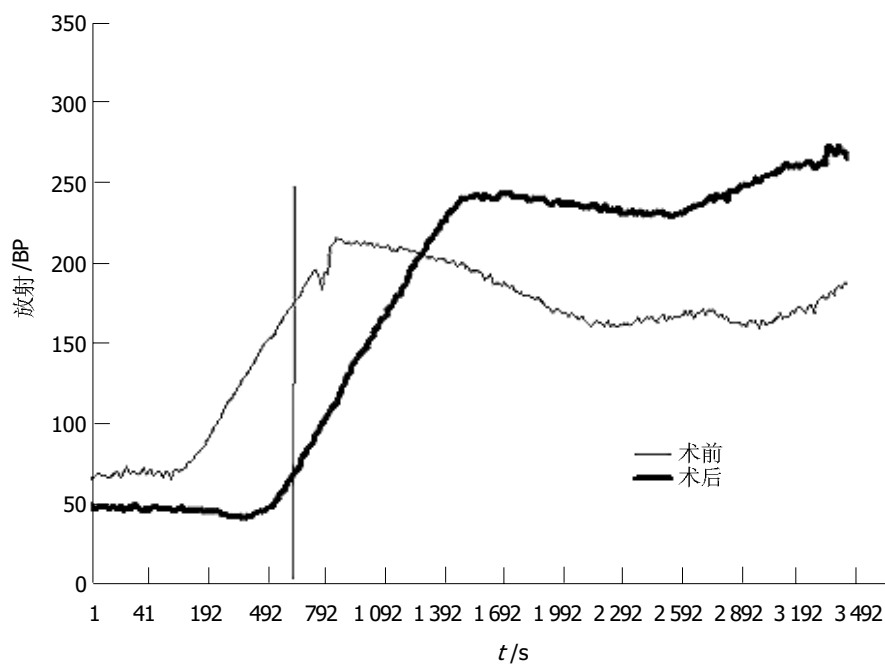


图 2 Hassab 手术对胆囊时间放射性的影响.

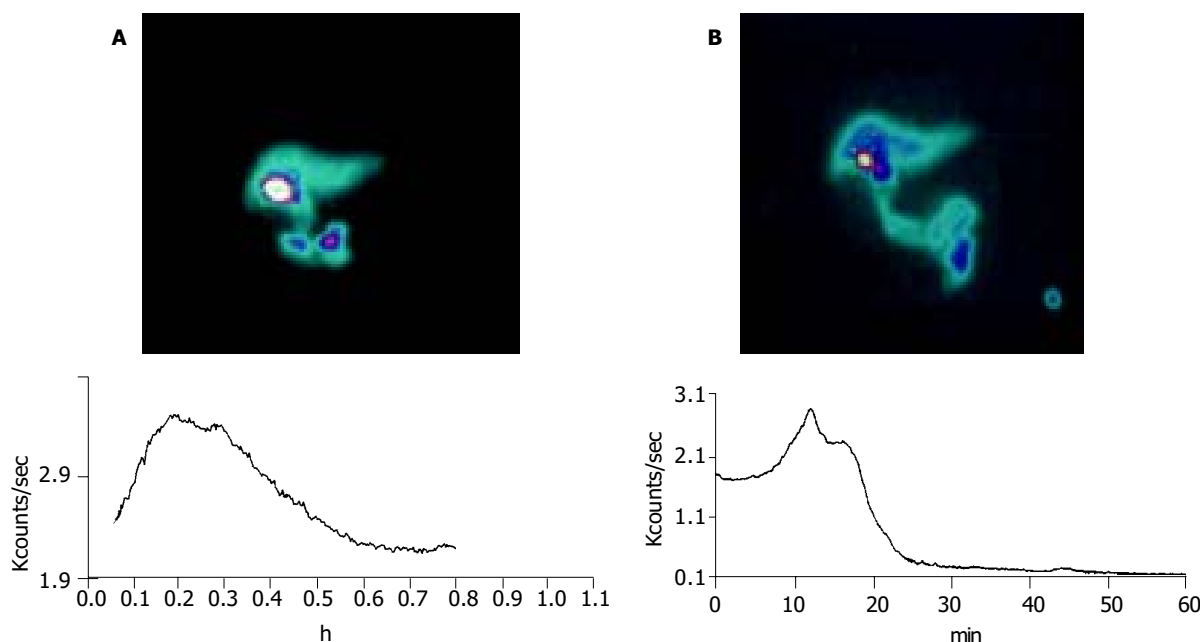


图3 栓塞术前胆囊的时间放射性曲线. A: 栓塞术前; B: 栓塞术后.

本术式被广泛应用<sup>[14-15, 17-18]</sup>. 该手术行脾切除后要离断贲门周围血管, 游离食管下段时为达到更彻底的断流效果需切断迷走神经前后干. 脾切除、胃冠状静脉栓塞术是行脾切除后用栓塞法代替了传统的断流方法, 注入TH胶后10-15 s内就在胃冠状静脉主干、各分支、食管下端静脉丛及胃底静脉丛内形成连续的血管铸型, 从而阻断了胃食管壁内、外的反常血流, 基本上达到简单又能完全断流的目的<sup>[19-21]</sup>. 由于该术式不解剖贲门周围组织, 迷走神经得以保留. 两种断流术都保留了消化道的完整性, 而对迷走神经的处理完全不同. 所以通过对比两种手术后各项指标的变化研究人迷走神经的功能不失为一种较好的临床研究模型. 虽然患者的肝病基础可能对研究产生一定的干扰, 但可以采取将每位患者的肝功能调整到Child A级、对同一患者进行术前术后的自身对照研究等方法尽可能将干扰降低到最小. 放射性核素<sup>99m</sup>Tc-EHIDA能特异性地被肝细胞摄取, 并很快随胆汁排泄, 经胆道系统、肠道排出体外. 进行动态显像能动态反映胆汁流动的全过程, 图像清晰, 分辨率高, 是形态和功能相结合的显像, 准确性较高, 患者辐射剂量很低, 是研究胆囊及胆道运动功能的较好方法<sup>[27-29]</sup>.

动物实验表明, 在消化间期迷走神经是维持胆囊张力的重要因素<sup>[12-13, 23, 30]</sup>. 多数学者认为, 虽然在消化间期胆囊呈松弛状态, 但也不是简单地、被动地持续充盈和舒张, 也呈现节律性收缩和舒张<sup>[12-13]</sup>, 不断使肝脏分泌的稀薄胆汁与胆囊内的浓缩胆汁进行交换<sup>[31-34]</sup>. 这种胆汁交换受胆囊张力和胆道压力的影响. 因为张力减低会影响胆囊原有胆汁的排出, 胆道压力减低会影响肝脏分泌的稀薄胆汁进入胆囊. 我们在注射<sup>99m</sup>Tc-EHIDA之前受试者已经禁食一夜, 胆囊内存有大量不含核素的胆汁, 而注射<sup>99m</sup>Tc-EHIDA后胆囊逐渐显

影, 说明肝脏分泌的含有核素的胆汁不断与胆囊胆汁进行交换. 有研究发现完全切断两侧迷走神经胆囊容积可增大一倍<sup>[11]</sup>, 说明切断迷走神经后胆囊张力减低是影响胆汁交换主要因素. 我们发现在切断迷走神经后的空腹状态下, 注射<sup>99m</sup>Tc-EHIDA 30 min后胆囊的放射性计数明显减少. 我们认为这不是胆囊容积减少, 而是说明切断迷走神经使消化间期的胆囊张力减低, 造成同一时间内胆汁流入胆囊的量明显减少.

Xynos *et al*<sup>[35]</sup>研究发现, 患有胆囊结石的患者脂餐后胆囊不是马上收缩, 而是有较长的潜伏期. 我们也发现切断迷走神经后患者脂餐后胆囊收缩的潜伏期明显延长(min;  $14.2 \pm 5.0$  vs  $2.4 \pm 1.4$ ,  $P < 0.01$ ). 由于切断迷走神经后迷走神经的头期兴奋不能传到胆囊, 只有食物到达胃窦部及十二指肠上段后才能通过各种途径使胆囊收缩, 因此切断迷走神经可造成脂餐后胆囊收缩延迟. 胆囊及Oddi括约肌的运动主要受迷走神经的调节<sup>[12-13]</sup>, 而肝脏分泌胆汁的过程主要受体液因素的调节, 迷走神经对肝脏分泌胆汁的作用不大<sup>[36-39]</sup>. 切断迷走神经使脂餐后胆囊及Oddi括约肌的运动延迟, 而脂餐可能通过某些体液途径使肝脏的胆汁分泌增加. 使胆道的压力一过性升高. 本研究结果显示, 在潜伏期胆囊的放射性计数明显增加( $GBLI\ 2\ 906.1 \pm 1\ 956.8$ ,  $GBLR\ 116.0 \pm 41.9\%$ ), 与文献<sup>[40]</sup>报道结果相似. 我们认为其主要原因是胆道压力升高, 使含核素较多的胆汁进入胆囊的速度加快造成的. 具体机制尚有待于进一步研究. 胆囊的GBEP反映脂餐后胆囊持续收缩的时间、GBEF反映餐后胆囊持续收缩排出胆汁的百分比、GBER反映单位时间内排出胆汁的百分比, 是反映胆囊收缩力的重要指标. 本研究发现切断迷走神经后餐后胆囊的GBEP明显缩短( $P < 0.05$ ), GBEF和GBER明显降低( $P < 0.01$ ), 说明餐后胆囊的运动功能明显减弱.

与动物实验结果基本一至, 说明人迷走神经在餐后胆囊运动过程中起重要的调节作用, 切断迷走神经会使餐后胆囊运动功能明显减弱。

#### 4 参考文献

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