

[文献报道]

Serosal Laceration During Firing of Powered Linear Stapler Is a Predictor of Staple Malformation

虽然腔镜吻合器取得了长足的进步，吻合口瘘仍然存在，是围手术期的重要并发症。为了进一步减少组织损伤，电动腔镜吻合器最近开始出现。为了研究使用电动腔镜吻合器过程中吻合钉成型不佳的预测方法和预压榨以及慢击发方法的作用，2017年 Fumihiko Matsuzawa 等人进行了动物实验，该试验结果 2017 年发表在 *Surgical Innovation* 上。

该试验选取 6 个月的猪胃作为研究材料，因为该组织与人结直肠壁厚度相似。

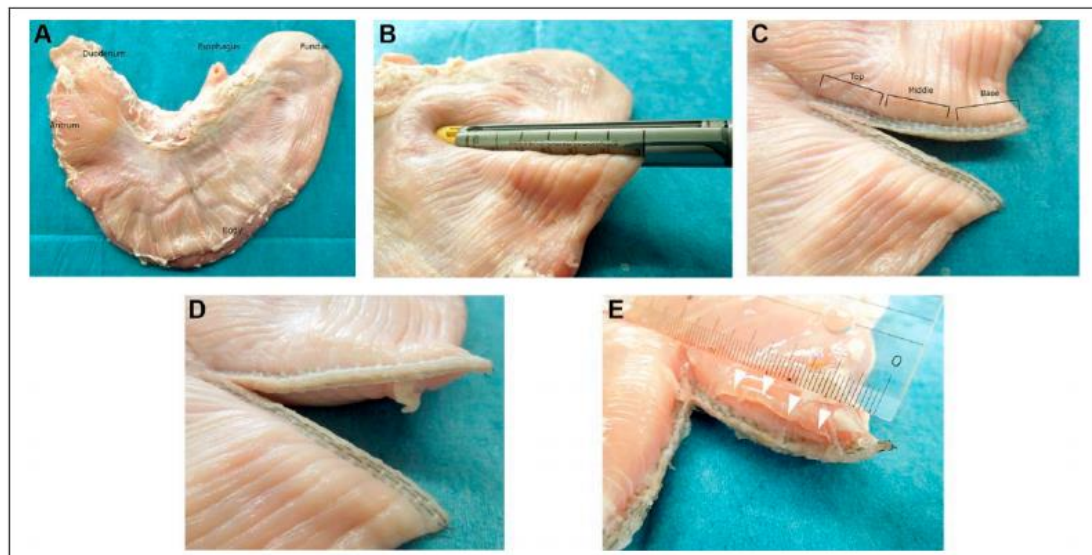


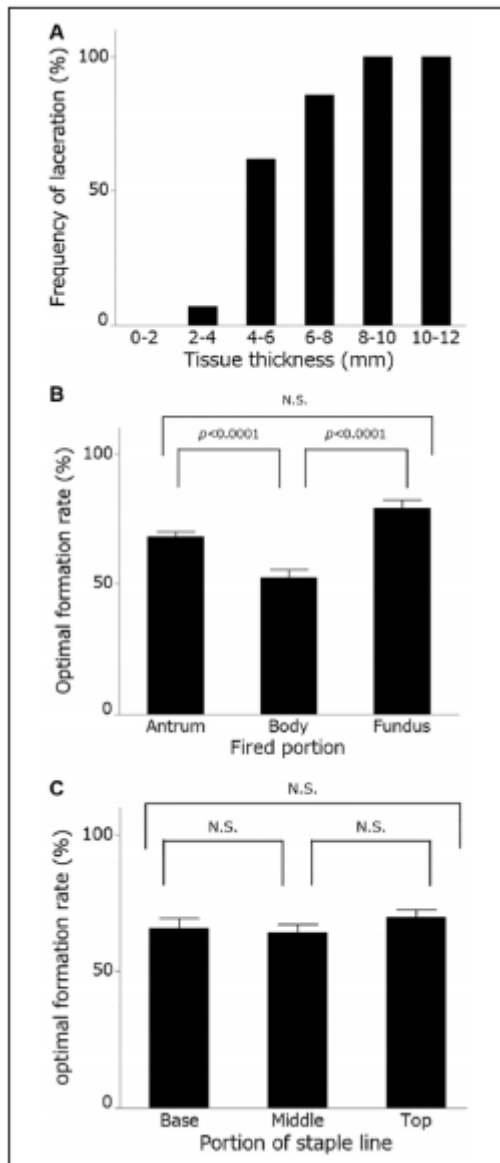
Figure 1. Representative images of the porcine stomachs that were used in this study. (a) The overview of the porcine stomach. (b) Application of a powered stapler with a gold cartridge. (c) Staple line was divided into 3 portions (top, middle, and base). (d) Representative image of successful stapled case. (e) Representative image in which serosal laceration (white arrow head) occurred. (f) Representative images of the optimal formation/suboptimal formation staple.

该试验应用电动腔镜吻合器金色钉仓（3.8mm 钉腿，关闭高度 1.8mm）进行研究，在猪胃大弯侧进行试验以尽可能避免吻合器的转角产生的影响。并且将吻合线分为顶部、中部、底部三个部分。操作方法采用无预压榨、60 秒预压榨、180 秒预压榨；正常击发、60 秒慢击发、180 秒慢击发，从而分为 9 组进行研究。操作后对浆膜层撕裂和钉成型进行评估。

最终，该研究评估了 4422 个钉（54 个钉仓），评估组织厚度和浆膜层撕裂/理想钉成型率之间的关系。并且评估了 9322 个钉（108 个钉仓），评估钉成型的预测模型，并且评估预压榨和慢击发的效果。

结果:

一、组织厚度影响浆膜撕裂的发生。8mm 以上的组织厚度全部发生浆膜层撕裂。组织较厚的体部胃理想的钉成型率明显低于近心端和幽门端。而在吻合口线的顶部、中部和底部之间，理想的钉成型率之间无明显差异。



二、较长时间的预压榨显著减少浆膜撕裂，但是，慢击发不能减少浆膜层撕裂。

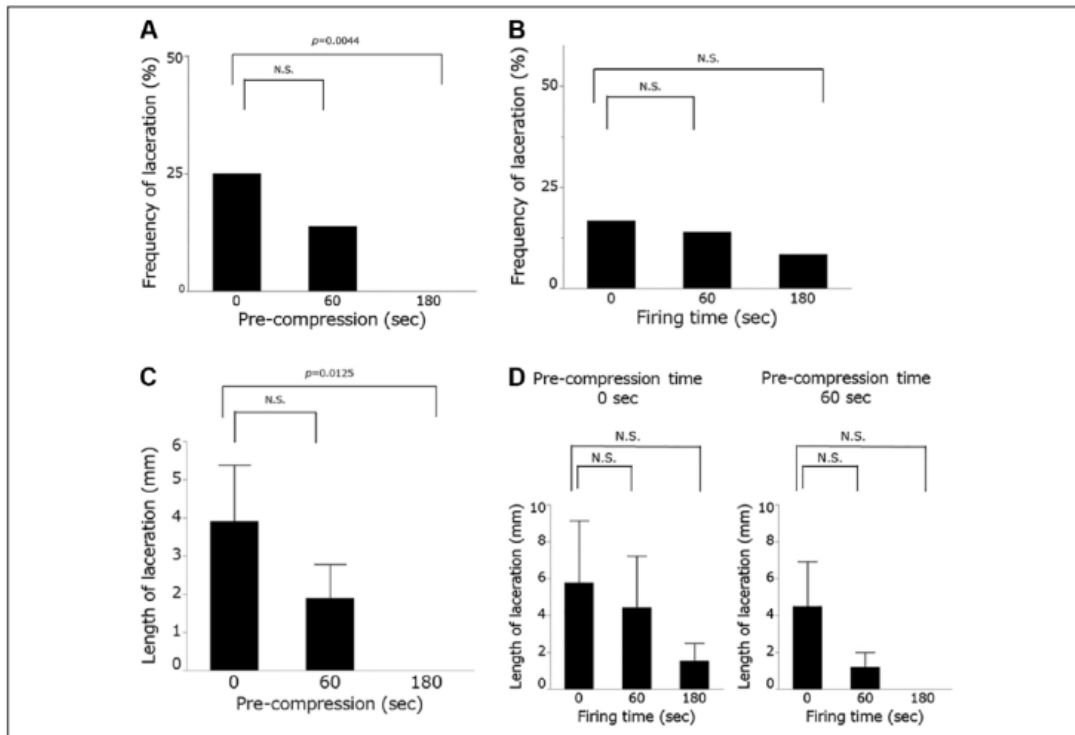


Figure 3. Comparison of serosal laceration in the different precompression/slow stapling groups. (a) A longer precompression time significantly decreased the frequency of laceration. (b) A longer firing time had a tendency to decrease the frequency of laceration, but not significantly. (c) The laceration length at a precompression time of 0 seconds was significantly lower than that at a precompression time of 180 seconds. (d) Slow firing had a tendency to shorten the laceration length in all groups, but not significantly.

三、预压榨明显增加理想的钉成型率。60 秒和 180 秒的预压榨对于理想的钉成型率效果之间无明显统计学差异。

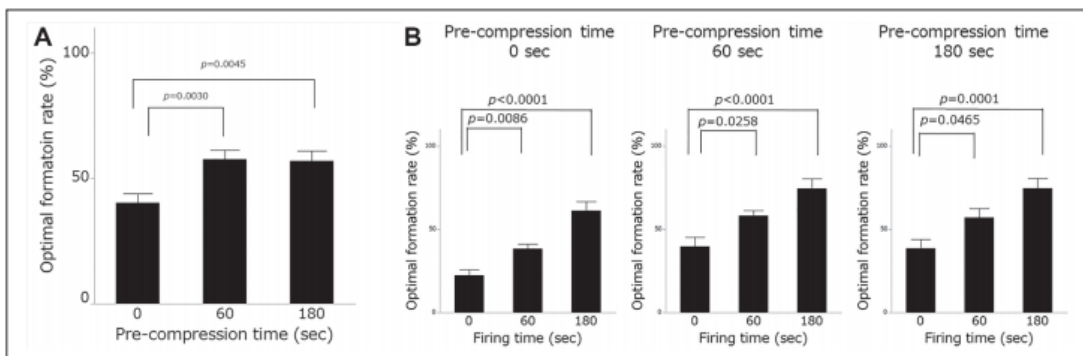


Figure 4. Comparison of optimal formation rates in different precompression/slow stapling groups. (a) The optimal formation rate at a precompression time of 0 seconds was significantly lower than that at a precompression time of 60 and 180 seconds. (b) Slow firing improved the optimal formation rate in all groups.

四、无预压榨、无慢击发和浆膜层撕裂与较差的钉成型率之间密切相关。

Table 2. Relationship Between Optimal Formation Rate and Material/Technical Factors.

		Optimal Formation Rate			P	Optimal Formation Rate			P	Optimal Formation Rate			P	
		Total	<45%	≥45%		<50%	≥50%	<55%		≥55%	<60%	≥60%		
Precompression time	0 s	36	23	13	.0002	26	10	.0007	30	6	.0019	30	6	.0135
	60 s / 180 s	72	19	51		27	45		38	34		43	29	
Firing time	0 s	36	27	9	<.0001	30	6	<.0001	31	5	<.0004	32	4	<.0008
	60 s / 180 s	72	15	55		23	49		37	35		41	31	
Serosal laceration	(+)	14	11	3	.0014	12	2	.0033	12	2	.0588	12	2	.1205
	(-)	94	31	61		41	53		56	38		61	33	

作者在文中指出，预压榨对于理想的钉成型至关重要，应用电动吻合器亦然。虽然适当的手术技术是保证合适血供、减少组织压力的关键，正确的应用器械也是预防吻合口瘘的重要因素。在该实验中，预压榨技术不仅仅提高了理想的钉成型率，也减少了浆膜层撕裂的发生率。

并且指出，相比较传统的手动吻合器，在该实验中，新型的电动吻合器吻合线的顶部和底部之间钉成型率无明显差异，作者认为击发过程中电动吻合器的稳定性提升了对目标组织和周围组织的控制，造成了如此优秀的结果。

最终，作者总结，该实验表明浆膜层撕裂可以作为钉成型率的一个预测因子；并且显示了预压榨和慢击发的重要性。

Fumihiko Matsuzawa et al . Serosal Laceration During Firing of Powered Linear Stapler Is a Predictor of Staple Malformation . Surgical Innovation.2017 Dec;24(6):590-597.