

Assessment of a novel stapler performance for laparoscopic sleeve gastrectomy

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BACKGROUND

- Optimal stapler selection during laparoscopic sleeve gastrectomy requires careful balance between tissue compression, hemostasis, and mechanical integrity.
- Junctions along a staple line can further increase the risks of technical or mechanical staple line failures.
- The aim of this study was to compare two commonly utilized laparoscopic linear gastrointestinal staplers (Ethicon, Medtronic) with a novel linear stapler (Titan) designed to perform a sleeve gastrectomy with a single stapler firing.

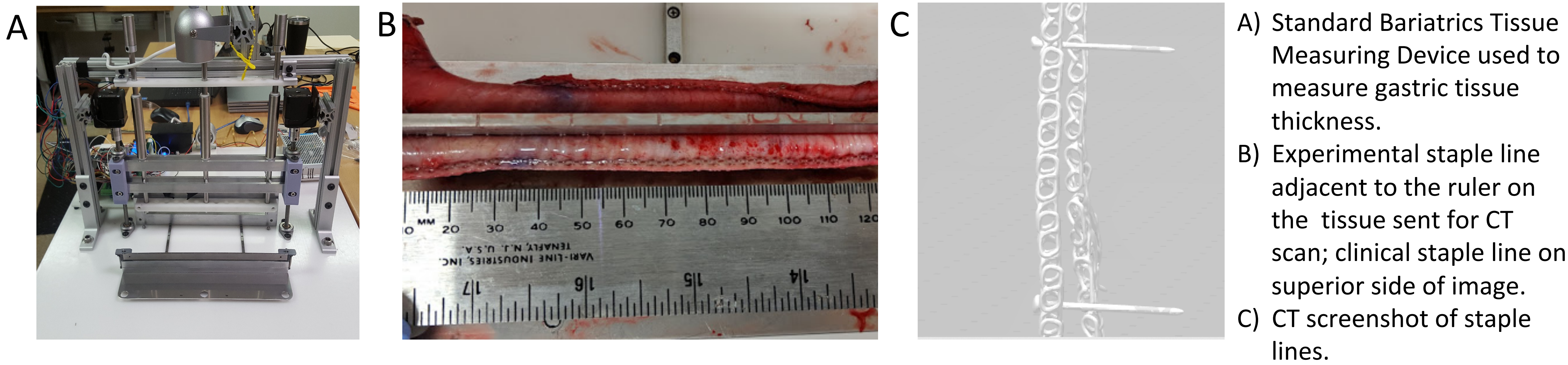
HYPOTHESIS

- We hypothesized that the Titan stapler would have equivalent stapling function to Medtronic and Ethicon staplers, with the advantage of a single fire.

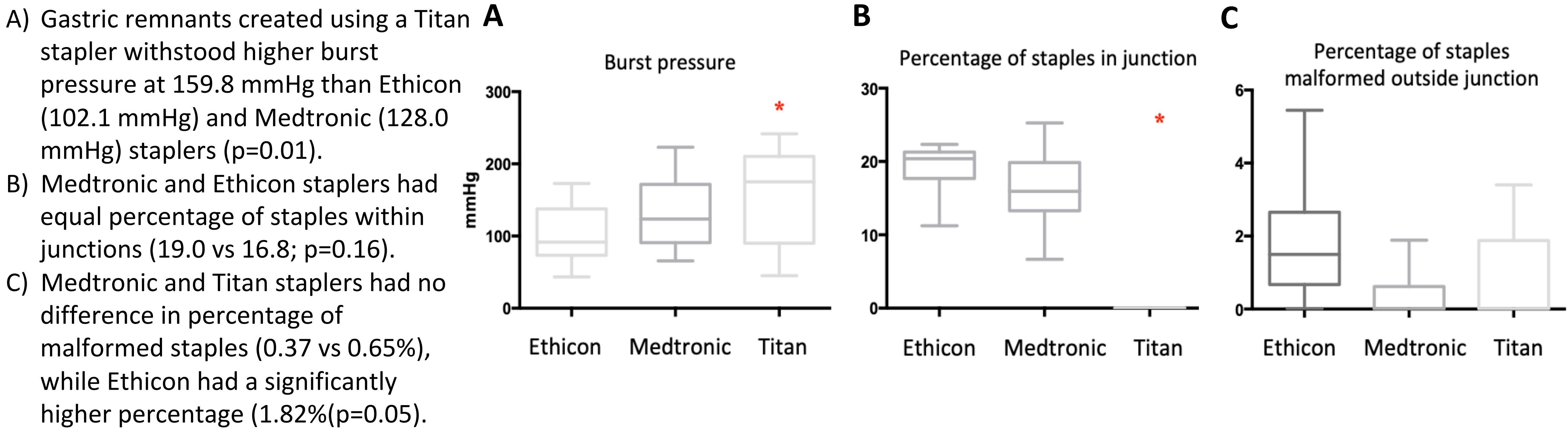
METHODS

- Excised gastric remnants from laparoscopic sleeve gastrectomy were utilized and tissue thickness measured from fundus to antrum.
- An optimized experimental staple line was created and the remnant was insufflated to determine the staple line burst pressure.
- The doubly stapled (clinical and experimental lines) gastric specimen underwent analysis for staple junctional location, malformation, and height.

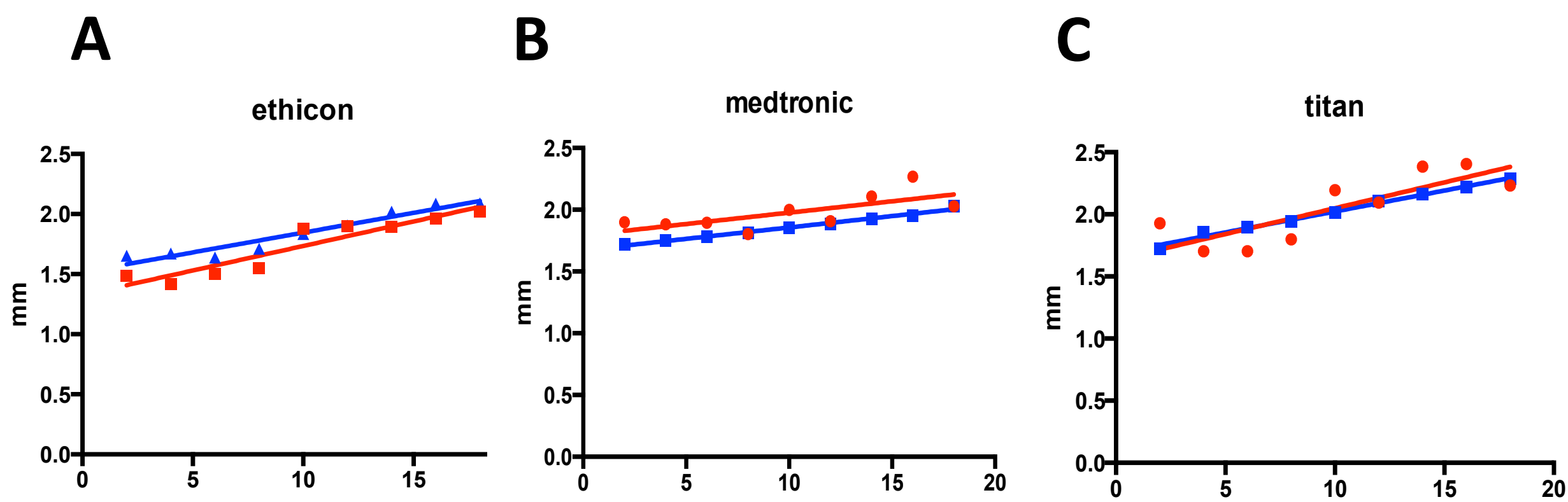
Novel mechanism for tissue measurement and staple line imaging



RESULTS



Tissue thickness vs staple height



Linear regression using the average staple height and tissue thickness from each stapler type; area between the curves was determined. Titan stapler had the smallest average difference between the two curves at 0.32mm², compared with Medtronic (1.98mm²) and Ethicon (1.77mm²).

Burst location

Location of burst and number of bursts occurring at a stapler junction, by stapler type. There was no significant difference between groups by burst location ($p=0.45$).

		Ethicon N=17	Medtronic N=18	Titan N=15
Burst location	Remote to staple line	4	2	2
	Staple line- top third	4	8	8
	Staple line- middle third	7	3	5
	Staple line- bottom third	2	5	0
Number of burst at stapler junction		6	6	0

SUMMARY

- Titan stapler withstood a significantly higher burst pressure than both Ethicon and Medtronic linear cutting staplers.
- While the Medtronic and Ethicon staplers had a similar percentage of staples in junctions, the Titan stapler has no junctions.
- The Medtronic and Titan staplers had no difference in percentage of malformed staples, while the Ethicon stapler had a significantly higher percentage.
- Additionally, there were no differences in mismatch between staple height and tissue thickness between experimental groups.

CONCLUSIONS

The Titan stapler conveys the mechanical benefits of higher burst pressure with the advantage of single load functionality. This single staple load eliminates staple line junctions without sacrificing the integrity of staple formation.

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