Undergraduate Students, Medical, Biomedical and Health Sciences

In Vitro Comparison of Two Single Layer Hand Sewn End-to-End Anastomosis Techniques in Normal Equine Jejunum: A Pilot Study

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ABSTRACT

Background: The equine small intestine can be affected by a variety of disorders, which may require some form of bypass or anastomosis procedure. There are no published descriptions of the hand- sewn end-to-end single layer simple continuous Appositional technique for equine jejunojejunostomy.

Objective: To compare and evaluate differences in the single layer continuous Appositional and the single layer continuous Lembert with respect to construction time, leakage pressure and bursting pressure.

Hypothesis: We hypothesized that the time spent in the execution, leakage pressure and bursting pressure will be similar between the single layer continuous Lembert and the single layer simple continuous Appositional techniques. Since this is a pilot study; it is the first step to prove the efficacy of the Appositional technique by showing its similarity with the Lembert technique, considering the latter to be the 'gold standard'.

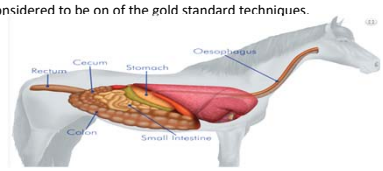
Methodology: Thirty-Seven intestinal segments from two horses were used to compare the single layer continuous Appositional and single layer continuous Lembert techniques. The time taken to execute the anastomoses, and the number of bites taken for each pattern, were recorded. Biomechanical testing was performed to determine leakage pressure and bursting pressure.

Result: The comparison in construction time between the Lembert group (mean, 24.23 mins, n=19) and the Appositional group (mean, 21.74 mins, n=18) were found to be statistically insignificant (P=0.3088). There were also no changes in Leakage pressure (P=0.3862) and bursting pressure (P=0.3135) between the two groups.

Conclusion: This study has demonstrated that the Appositional technique is a viable alternative to the Lembert technique, with respect to construction time, leakage and bursting pressures, for the purpose of end-to-end jejunojejunal anastomosis in the horse.

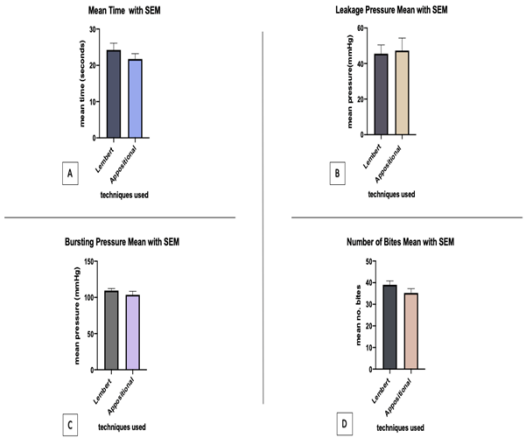
INTRODUCTION

The anatomy of the equine gastrointestinal tract starts at the mouth and follows into the esophagus into the stomach. The terminal part of the stomach joins the small intestine which is divided into three parts, one of which is the jejunum. Obstruction is defined as physical blockage of the normal ingesta flow, which is one of the most common pathologies in horses. Resection and anastomosis are performed in such cases. Most common anastomosis technique is the hand sewn and specifically the inverting single layer continuous Lembert which considered to be on of the gold standard techniques.



RESULTS

Jejunal segments (n=37) of 2 adult Arabian horses were tested. Subjects weighed approximately 450 kg. Horses were euthanized for reasons other than gastrointestinal disease. The difference in construction time between the Lembert group (mean, 24.23 min, n=19) and the Appositional group (mean, 21.74 min, n=18) were found to be insignificant (P=0.3088). Leakage Pressure (P=0.3862) and Bursting Pressure (P=0.3135) measurements showed no statistically significant difference between the two groups. The number of bites (Lembert mean, 39 bites. Appositional mean, 35.22 bites) were also taken into consideration and verified no difference (P=0.1658).



Time of suturing (L)/ min	Time of suturing (A)/ min	Leakage Pressure (L)/ mmHg	Leakage Pressure (A)/ mmHg	Bursting Pressure (L)/ mmHg	Bursting Pressure (A)/ mmHg	Number of Bites (L)	Number of Bites (A)
45.37	18.35	28	20	86	90	35	23
42.16	22.57	78	12	102	90	28	33
31.23	34.02	60	68	120	98	30	28
20	25.04	76	100	120	136	28	42
29.37	22.5	42	64	104	116	30	35
30.23	21.02	60	32	132	112	38	37
24.34	17.4	14	ERROR	134	104	33	35
20.16	17.29	18	16	90	92	48	31
18.04	37.16	18	NR	104	NR	37	30
17.21	21.12	45	20	93	52	36	21
24.16	23.55	35	75	108	113	47	31
19.37	27.33	33	76	112	121	40	32
26.11	23.45	54	35	113	109	41	40
19.41	16.44	49	89	111	110	39	45
18.19	14.06	95	43	102	121	34	35
18.32	13.52	35	35	115	118	50	33
17.39	19.26	46	18	112	59	50	54
21.15	17.15	44	21	109	105	53	49
18.16	NR	35	80	112	119	44	NR

CONCLUSION

The results had demonstrated that the Appositional technique is a viable alternative to the Lembert technique for the purpose of end-to-end jejunojejunal anastomosis in the horse. This study is a set mark for future studies that can be done on the novel Appositional single layer continuous technique.

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METHODOLOGY

Thirty- seven intestinal segments of the horse were used to compare the single layer continuous Appositional and single layer continuous Lembert techniques. The single layer continues Appositional technique is a novel technique that we are purposing to compare it with the standard single layer continuous Lembert technique. Laboratory experiments was performed by immersing the sutured intestinal segments into a water bath and visualizing the formation of bubbles which indicated the leakage pressure, as well as the rupturing of the suture which indicated the bursting pressure. The time taken to execute the anastomoses, and the number of bites taken for each pattern, were recorded. Statistical analysis was performed using GraphPad Prism 8.

Single layer continuous Appositional technique

Single layer continuous Lembert technique

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