

SUPPLEMENTARY TABLES

Table SI 1: Rating for each question: minimal risk of bias 0; low risk of bias 1; moderate to high risk 2.

	<i>Is there a standardized sampling process for selecting the included devices?</i>	<i>Is testing consistent with all tests performed the same way?</i>	<i>Is the sample size calculation described justified?</i>	<i>Is there a well described, consistent method used to analyze the test data to produce the outcome measures?</i>	<i>Are all test results reported? If an outlier data point is removed is this well described and justified?</i>	<i>RISK OF BIAS #</i>	<i>RATING</i>
<i>Ahmed</i>	1	0	1	0	0	2	low
<i>Chang M</i>	0	0	1	0	0	1	low
<i>Cheng J</i>	1	0	1	0	0	2	low
<i>Connor</i>	0	1	1	0	0	2	low
<i>Eguchi</i>	2	0	2	0	0	2	moderate
<i>Glassbrenner</i>	0	0	1	0	0	1	low
<i>Gotschi</i>	1	0	0	0	0	1	low
<i>Johnson</i>	2	0	1	0	0	3	low
<i>Kamelger</i>	1	0	1	0	0	2	low
<i>Noonan</i>	1	0	1	0	2	4	moderate
<i>Nye</i>	1	0	1	0	1	3	moderate
<i>Petre</i>	2	0	1	0	0	3	low
<i>Rylander</i>	0	0	1	0	0	1	low
<i>Singh</i>	1	0	1	0	0	2	low
<i>Smith</i>	1	1	1	0	0	3	low

Table SI 2a: Raw data for displacement in DOM.

ALD	DOM displacement								
	N	Failure load (N)	SD	Retensioned or not	FLD/Control	N	Failure load (N)	SD	Retensioned or not
Johnson Tightrope NRT	8	2.2	0.62	NRT	Johnson Rigidloop	8	1.09	0.16	N/A
Johnson ToggleLoc NRT	8	3.69	2.39	NRT	Johnson XO	8	1.65	0.43	N/A
Johnson Tightrope RT	8	1.81	0.51	RT	Johnson Endobutton	8	1.05	0.05	N/A
Johnson ToggleLoc RT	8	3.22	1.41	RT	Johnson Endobutton	8	1.05	0.05	N/A
Noonan Tightrope NRT	5	0.96	0.07	NRT	Noonan Endobutton	5	0.42	0.08	N/A
Noonan Tightrope NRT+K	5	0.63	0.14	NRT	Noonan Endobutton	5	0.42	0.08	N/A
Noonan Tightrope RT	5	0.73	0.10	RT	Noonan Endobutton	5	0.42	0.08	N/A
Noonan Tightrope RT+K	5	0.38	0.09	RT	Noonan Endobutton	5	0.42	0.08	N/A
Noonan Tightrope NRT Unloaded	5	4.22	2.68	NRT	Noonan Endobutton	5	0.42	0.08	N/A
Noonan Tightrope RT Unloaded	5	0.51	0.11	RT	Noonan Endobutton	5	0.42	0.08	N/A
Cheng J Tightrope NRT	8	1.56	0.08	NRT	Cheng, J Endobutton	8	0.76	0.06	N/A
Cheng J Tightrope NRT+K	8	1.38	0.24	NRT	Cheng, J Endobutton	8	0.76	0.06	N/A
Cheng, J Graft Max NRT	8	2.11	0.57	NRT	Cheng, J Endobutton	8	0.76	0.06	N/A
Chang, M Tightrope NRT	6	1.99	0.4	NRT	Chang, M Endobutton	6	0.79	0.05	N/A
Eguchi Tightrope NRT	10	4.05	1.16	NRT	Eguchi Endobutton	10	2.03	0.31	N/A
Petre Tightrope NRT	5	1.1	0.2	NRT	Petre XO	5	1.2	0.17	N/A
Petre ToggleLoc NRT	5	2.18	0.31	NRT	Petre Endobutton	5	0.42	0.08	N/A
Gotschi Tightrope NRT	11	1.26	0.52	NRT	Gotschi FlippTack	8	1.823	0.17	N/A
Gotschi Variloop NRT	11	0.85	0.08	NRT	Gotschi FlippTack	8	1.823	0.17	N/A
Singh Ultrabutton RT	5	2.66	0.28	RT	Singh G-Lok	5	1.46	0.25	N/A
Singh Rigidloop RT	5	1.51	0.16	RT	Singh G-Lok	5	1.46	0.25	N/A
Singh ProCinch RT	5	1.6	0.09	RT	Singh G-Lok	5	1.46	0.25	N/A
Kamelger ToggleLoc 20 NRT	6	0.66	0.12	NRT	Kamelger Endobutton 20	6	0.15	0.01	N/A
Kamelger ToggleLoc 40 NRT	6	0.76	0.06	NRT	Kamelger Endobutton 40	6	0.22	0.03	N/A
Ahmed Rigidloop A NRT	6	1.67	0.27	NRT	Ahmed Endobutton	6	1.07	0.06	N/A
Ahmed ProCinch NRT	6	3.57	2.05	NRT	Ahmed Retrobutton	6	0.69	0.04	N/A
Ahmed Ultrabutton NRT	6	3.14	0.66	NRT	Ahmed Rigidloop NA	6	1.22	0.09	N/A

NRT: Non-retensioned, RT: Retensioned, N/A: Not applicable, SD: Standard deviation, DOM: Device-only model, ALD: Adjustable-loop device, FLD: Fixed-loop device, K: Knotted. N: Number of devices. Number "20" or "40" next to device refers to the length of the device loop in millimeters.

Table SI 2b: Raw data for displacement in ABM.

ALD	N	Animal model displacement							
		Failure load (N)	SD	Retensioned or not	FLD/Control	N	Failure load (N)	SD	Retensioned or not
Nye Tightrope RT	10	5.09	0.87	RT	Nye Endobutton	10	5.07	0.56	N/A
Nye Toggleloc RT	10	7.44	1.63	RT	Nye Endobutton	10	5.07	0.56	N/A
Smith Tightrope RT	8	2.78	0.85	RT	Smith Retrobutton	8	2.85	1.03	N/A
Smith Ultrabutton RT	8	2.76	0.45	RT	Smith Endobutton	8	2.85	0.74	N/A
Smith Graft Max RT	8	4.13	1.46	RT	Smith Endobutton	8	2.85	0.74	N/A
Noonan Tightrope NRT	5	2.7	0.5	NRT	Noonan Endobutton	5	3.00	0.30	N/A
Noonan Tightrope RT+K	5	1.5	0.30	RT	Noonan Endobutton	5	3.00	0.30	N/A
Chang, M Tightrope NRT	6	15.65	2.43	NRT	Chang, M Endobutton	6	14.88	1.79	N/A
Eguchi Tightrope 21 NRT	10	7.74	2.52	NRT	Eguchi Endobutton	10	5.88	1.06	N/A
Eguchi Tightrope 15 NRT	10	6.39	2.32	NRT	Eguchi Endobutton	10	5.88	1.06	N/A
Petre Tightrope NRT	10	4.47	0.65	NRT	Petre XO Button	10	3.5	0.5	N/A
Petre Toggleloc NRT	10	6.02	1.9	NRT	Petre Endobutton	10	3.37	0.27	N/A
Glasbrenner Ultrabutton NRT	8	8.1	1.50	NRT	Glasbrenner Endobutton	8	4.4	0.30	N/A
Glasbrenner Tightrope NRT	8	6.1	1.40	NRT	Glasbrenner FlippTack	8	4.1	0.60	N/A
Glasbrenner Graft Max NRT	8	4.7	1.00	NRT	Glasbrenner Endobutton	8	4.4	0.30	N/A
Conner ToggleLoc L NRT	2	6.52	0.72	NRT	Conner Endobutton L	3	4.84	0.72	N/A
Conner ToggleLoc A NRT	5	5.46	0.95	NRT	Conner Endobutton A	5	3.55	0.57	N/A
Gotschi Tighrope NRT	8	3.921	0.68	NRT	Gotschi FlippTack	8	4.666	0.72	N/A
Gotschi Variloop NRT	8	2.183	0.32	NRT	Gotschi FlippTack	8	4.666	0.72	N/A
Kamelger ToggleLoc 20 NRT	8	1.56	0.44	NRT	Kamelger Endobutton 20	8	0.66	0.19	N/A
Kamelger ToggleLoc 40 NRT	8	1.37	0.33	NRT	Kamelger Endobutton 40	8	0.5	0.13	N/A

NRT: Non-retensioned, RT: Retensioned, N/A: Not applicable, SD: Standard deviation, ALD: Adjustable-loop device, FLD: Fixed loop device, ABM: Animal bone model, K: Knotted. N: Number of devices. Number "15," "20," "21," or "40" next to device refers to the length of the device loop in millimeters.

Table SI 3a: Raw data for failure load in DOM.

ALD	DOM failure load								
	N	Failure load (N)	SD	Retensioned or not	FLD/Control	N	Failure load (N)	SD	Retensioned or not
Johnson Tightrope NRT	8	784	45	NRT	Johnson Rigidloop	8	1976	229	N/A
Johnson ToggleLoc NRT	8	1995	217	NRT	Johnson XO	8	2218	114	N/A
Johnson Tightrope RT	8	1020	421	RT	Johnson Endobutton	8	1530	180	N/A
Johnson ToggleLoc RT	8	2231	511	RT	Johnson Endobutton	8	1530	180	N/A
Noonan Tightrope NRT	5	886	39	NRT	Noonan Endobutton	5	1384.0	71.0	N/A
Noonan Tightrope RT	5	815	35	RT	Noonan Endobutton	5	1384.0	71.0	N/A
Noonan Tightrope NRT+K	5	1038	71	NRT	Noonan Endobutton	5	1384.0	71.0	N/A
Noonan Tightrope RT+K	5	1205	35	RT	Noonan Endobutton	5	1384.0	71.0	N/A
Noonan Tightrope NRT Unloaded	5	833	151	NRT	Noonan Endobutton	5	1384.0	71.0	N/A
Noonan Tightrope RT Unloaded	5	1057	156	RT	Noonan Endobutton	5	1384.0	71.0	N/A
Cheng J Tightrope NRT	8	800.9	112.5	NRT	Cheng, J Endobutton	8	1204.0	127.0	N/A
Cheng J Tightrope NRT+K	8	868	51.9	NRT	Cheng, J Endobutton	8	1204.0	127.0	N/A
Cheng, J Graft Max NRT	8	914.2	36.9	NRT	Cheng, J Endobutton	8	1204.0	127.0	N/A
Chang, M Tightrope NRT	6	925	38.12	NRT	Chang, M Endobutton	6	1410.0	118.4	N/A
Eguchi Tightrope NRT	10	866	53	NRT	Eguchi Endobutton	10	1430.0	148.0	N/A
Petre Tightrope NRT	5	841	55	NRT	Petre XO	5	2230	252	N/A
Petre ToggleLoc NRT	5	1561	112	NRT	Petre Endobutton	5	1456	130	N/A
Gotschi Tightrope NRT	11	827.31	34.02	NRT	Gotschi FlippTack	8	1317.12	120.99	N/A
Gotschi Variloop NRT	11	817.78	96.52	NRT	Gotschi FlippTack	8	1317.12	120.99	N/A
Singh Ultrabutton RT	5	1903	81.00	RT	Singh G-Lok	5	2178	118.00	N/A
Singh Rigidloop RT	5	1835	179.00	RT	Singh G-Lok	5	2178	118.00	N/A
Singh ProCinch RT	5	1456	137.00	RT	Singh G-Lok	5	2178	118.00	N/A
Kamelger ToggleLoc 20 NRT	6	1557.6	97.50	NRT	Kamelger Endobutton 20	6	1074.6	119.40	N/A
Kamelger ToggleLoc 40 NRT	6	1454.2	170.00	NRT	Kamelger Endobutton 40	6	1202.2	59.7	N/A
Ahmed Rigidloop A NRT	6	1676.62	58.13	NRT	Ahmed Endobutton	6	1524.11	135.13	N/A
Ahmed ProCinch NRT	6	811.32	25.42	NRT	Ahmed Retrobutton	6	1259.2	89.74	N/A
Ahmed Ultrabutton NRT	6	1710.69	58.10	NRT	Ahmed Rigidloop NA	6	1931.34	140.93	N/A

NRT: Non-retensioned, RT: Retensioned, N/A: Not applicable, SD: Standard deviation, DOM: Device-only model, ALD: Adjustable-loop device, FLD: Fixed-loop device, K: Knotted. N: Number of devices. Number "20" or "40" next to device refers to the length of the device loop in millimeters.

Table SI 3b: Raw data for failure load in ABM.

ALD	N	Failure Load (N)	SD	Animal model failure load					
				Retensioned or not	FLD/Control	N	Failure Load (N)	SD	Retensioned or not
Nye Tightrope RT	10	801.1	56.3	RT	Nye Endobutton	10	803.9	92.2	N/A
Nye ToggleLoc RT	10	682.1	182.4	RT	Nye Endobutton	10	803.9	92.2	N/A
Smith Tightrope RT	8	958	40	RT	Smith Retrobutton	8	689	134	N/A
Smith Ultrabutton RT	8	746	180	RT	Smith Endobutton	8	712.0	78.0	N/A
Smith Graft Max RT	8	761	150	RT	Smith Endobutton	8	712.0	78.0	N/A
Noonan Tightrope NRT	5	786	166	NRT	Noonan Endobutton	5	866.0	102.0	N/A
Noonan Tightrope RT+K	5	818	168	RT	Noonan Endobutton	5	866.0	102.0	N/A
Chang, M Tightrope NRT	6	888	90.31	NRT	Chang, M Endobutton	6	843.0	111.4	N/A
Eguchi Tightrope 21 NRT	10	880	60	NRT	Eguchi Endobutton	10	1115.0	274.0	N/A
Eguchi Tightrope 15 NRT	10	860	70	NRT	Eguchi Endobutton	10	1115.0	274.0	N/A
Petre Tightrope NRT	10	859	43	NRT	Petre XO Button	10	1748	140	N/A
Petre ToggleLoc NRT	10	1334	81	NRT	Petre Endobutton	10	1456	101	N/A
Conner ToggleLoc L NRT	2	876	207.00	NRT	Conner Endobutton L	3	987	305	N/A
Conner ToggleLoc A NRT	5	913	82.00	NRT	Conner Endobutton A	5	1191	150.00	N/A
Gotschi Tightrope NRT	8	873.47	56.34	NRT	Gotschi Flipptack	8	1201.98	234.04	N/A
Gotschi Variloop NRT	8	849.49	68.25	NRT	Gotschi Flipptack	8	1201.98	234.04	N/A
Kamelger ToggleLoc 20 NRT	8	943.4	199.00	NRT	Kamelger Endobutton 20	8	1024.7	75.00	N/A
Kamelger ToggleLoc 40 NRT	8	945.4	233.10	NRT	Kamelger Endobutton 40	8	1122.6	95.3	N/A
Rylander ToggleLoc NRT	9	559.7	101.30	NRT	Rylander Endobutton	10	716.7	128.20	N/A

NRT: Non-retensioned, RT: Retensioned, N/A: Not applicable, SD: Standard deviation, ALD: Adjustable-loop device, ABM: Animal bone models. Number "15," "20," "21," or "40" next to device refers to the length of the device loop in millimeters.

SUPPLEMENTARY FIGURES

Secondary meta-analysis

Animal combined displacement

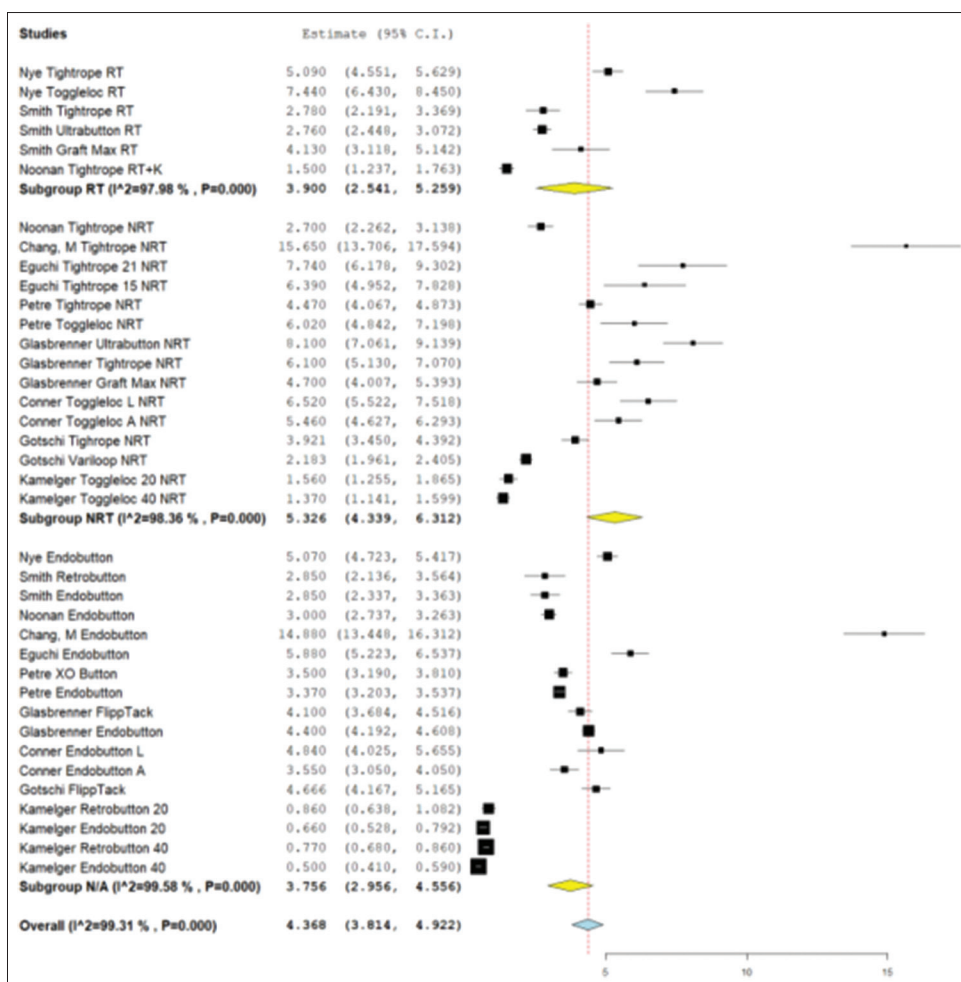


Figure SI 1: Forest plot for secondary analysis of total displacement in animal models. NRT: Not retensioned, RT: Retensioned, K: Knotted. Unloaded refers to the Noonan *et al.* protocol that featured smaller lower limit forces during cyclical testing.^[17] Number “15,” “20,” “21,” or “40” next to the device refers to the length of the device loop in millimeters. “L” refers to placement on the lateral cortex, whereas “A” refers to placement on the anterior cortex. CI: Confidence interval. Yellow is the subgroup standardized mean difference. Blue is combined standardized mean difference. Black squares refer to the mean for that study and group.

Combined animal failure load

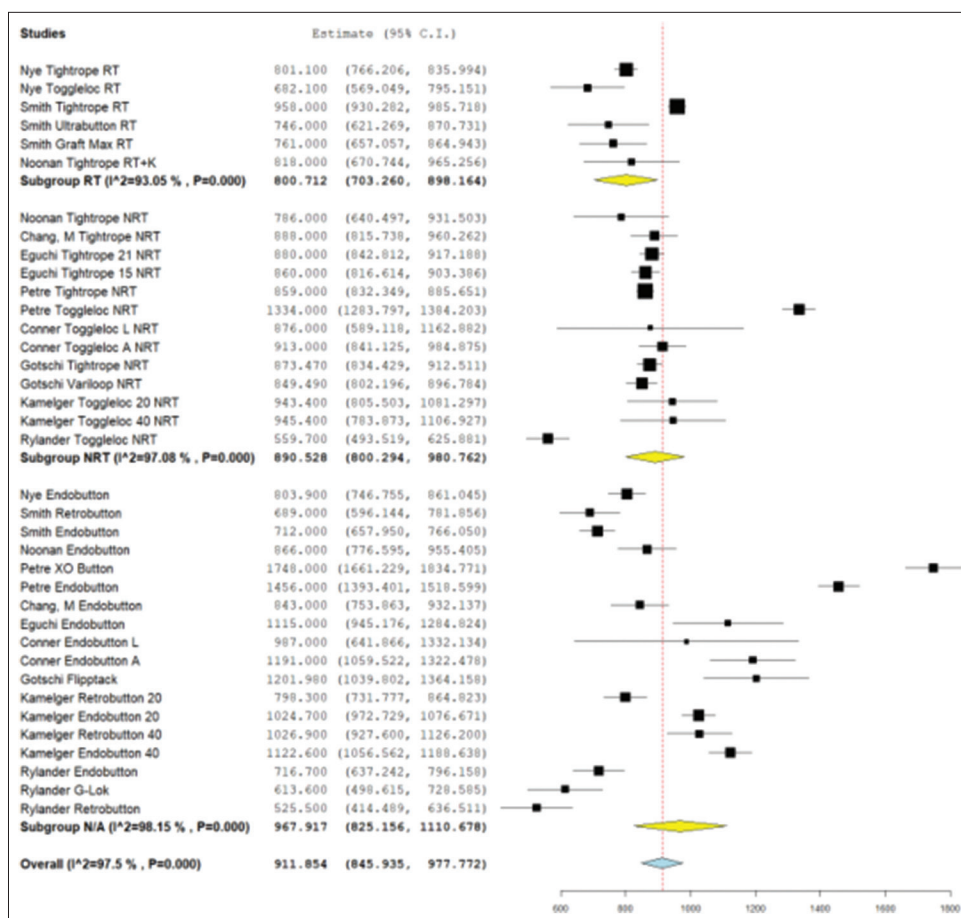


Figure SI 2: Forest plot for secondary analysis of load to failure in animal models. NRT: Not retensioned, RT: Retensioned, K: Knotted. Unloaded refers to the Noonan *et al.* protocol that featured smaller lower limit forces during cyclical testing.^[17] Number “15,” “20,” “21,” or “40” next to the device refers to the length of the device loop in millimeters. “L” refers to placement on the lateral cortex, whereas “A” refers to placement on the anterior cortex. CI: Confidence interval. Yellow is the subgroup standardized mean difference. Blue is combined standardized mean difference. Black squares refer to the mean for that study and group.