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Appendix Table 1a. Percentage of screws inserted at each decile of insertional torque

	Attendings	Junior Residents			Senior Residents		
Insertional torque	Baseline	Baseline	Post-training	Final testing	Baseline	Post-training	Final testing
Percutaneous technique							
	n = 35	n = 50	n = 50	n = 50	n = 75	n = 75	n = 75
0-10%	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11-20%	0.0	0.0	0.0	0.0	6.7	0.0	0.0
21-30%	0.0	2.0	2.0	2.0	13.3	2.7	8.0
31-40%	8.6	6.0	22.0	12.0	8.0	13.3	13.3
41-50%	14.3	10.0	18.0	0.0	9.3	16.0	10.7
51-60%	34.3	16.0	22.0	18.0	4.0	25.3	14.7
61-70%	25.7	10.0	16.0	14.0	10.7	28.0	18.7
71-80%	8.6	24.0	12.0	24.0	18.7	8.0	20.0
81-90%	2.9	8.0	4.0	18.0	12.0	5.3	8.0
91-99%	0.0	6.0	2.0	0.0	1.3	0.0	5.3
Stripped	5.7	18.0	2.0	12.0	16.0	1.3	1.3
Total %	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Open, dominant hand technique							
	n = 35	n = 50	n = 50	n = 50	n = 75	n = 75	n = 75
0-10%	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11-20%	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21-30%	0.0	0.0	0.0	0.0	4.0	0.0	0.0
31-40%	0.0	0.0	10.0	6.0	6.7	9.3	5.3
41-50%	11.4	0.0	26.0	8.0	8.0	16.0	17.3
51-60%	25.7	8.0	32.0	20.0	4.0	30.7	10.7
61-70%	17.1	30.0	20.0	22.0	10.7	33.3	30.7
71-80%	31.4	28.0	4.0	26.0	38.7	10.7	22.7
81-90%	8.6	22.0	4.0	12.0	13.3	0.0	9.3
91-100%	2.9	0.0	0.0	0.0	5.3	0.0	2.7
Stripped	2.9	12.0	4.0	6.0	9.3	0.0	1.3
Total %	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Open, non-dominant hand technique							
	n = 35	n = 50	n = 50	n = 50	n = 75	n = 75	n = 75
0-10%	0.0	0.0	0.0	0.0	0.0	0.0	0.0

11-20%	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21-30%	0.0	0.0	0.0	0.0	1.3	4.0	0.0
31-40%	0.0	0.0	18.0	0.0	8.0	8.0	0.0
41-50%	2.9	6.0	16.0	4.0	9.3	20.0	6.7
51-60%	2.9	6.0	22.0	40.0	5.3	21.3	10.7
61-70%	28.6	14.0	22.0	8.0	21.3	20.0	46.7
71-80%	51.4	40.0	14.0	22.0	28.0	20.0	21.3
81-90%	8.6	18.0	4.0	16.0	8.0	6.7	10.7
91-100%	0.0	2.0	0.0	0.0	1.3	0.0	1.3
Stripped	5.7	14.0	4.0	10.0	17.3	0.0	2.7
Total %	100.0	100.0	100.0	100.0	100.0	100.0	100.0
All techniques combined							
	n = 105	n = 150	n = 150	n = 150	n = 225	n = 225	n = 225
0-10%	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11-20%	0.0	0.0	0.0	0.0	2.2	0.0	0.0
21-30%	0.0	0.7	0.7	0.7	6.2	2.2	2.7
31-40%	2.9	2.0	16.7	6.0	7.6	10.2	6.2
41-50%	9.5	5.3	20.0	4.0	8.9	17.3	11.6
51-60%	21.0	10.0	25.3	26.0	4.4	25.8	12.0
61-70%	23.8	18.0	19.3	14.7	14.2	27.1	32.0
71-80%	30.5	30.7	10.0	24.0	28.4	12.9	21.3
81-90%	6.7	16.0	4.0	15.3	11.1	4.0	9.3
91-100%	1.0	2.7	0.7	0.0	2.7	0.0	3.1
Stripped	4.8	14.7	3.3	9.3	14.2	0.4	1.8
Total %	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Appendix 1b. Statistical comparisons for insufficiently tightened screws (insertional torque <50%) before and after training

		Pre-training N (%)	**Post-training N (%)**	**P-value (Pre vs post)**	**Final testing N (%)**	**P-value (Pre vs final)**
Percutaneous technique	Junior residents	9 (18.0) 95% CI: 7.4 – 28.7	21 (42.0) 95% CI: 28.3 – 55.7	**0.003**	7 (14.0) 95% CI: 4.4 – 23.6	**<0.0001**
	Senior residents	26 (35.6) 95% CI: 24.6 – 46.6	24 (32.8) 95% CI: 21.4 – 42.6	**<0.0001**	24 (32.0) 95% CI: 21.4 – 42.6	**<0.0001**
	Attendings	8 (20.0) 95% CI: 7.6 – 32.4	--	--	--	--
Open, dominant hand technique	Junior residents	0 (0) 95% CI: N/A	18 (36.0) 95% CI: 22.7 – 49.3	N/A	6 (12.0) 95% CI: 3.0 – 21.0	N/A
	Senior residents	14 (18.7) 95% CI: 9.9 – 27.5	19 (25.3) 95% CI: 15.5 – 35.2	0.34	17 (22.7) 95% CI: 13.2 – 32.1	0.59
	Attendings	4 (10.0) 95% CI: 0.7 – 19.3	--	--	--	--
Open, non-dominant hand technique	Junior residents	3 (6.0) 95% CI: 0 – 12.6	17 (34.0) 95% CI: 20.9 – 47.1	**0.001**	1 (2.0) 95% CI: 0 – 5.9	0.32
	Senior residents	14 (18.9) 95% CI: 10.0 – 27.8	23 (30.7) 95% CI: 20.2 – 41.1	0.11	5 (6.9) 95% CI: 1.1 – 12.6	**0.04**
	Attendings	1 (2.5) 95% CI: 0 – 7.3	--	--	--	--
All techniques combined	Junior residents	12 (8.0) 95% CI: 3.7 – 12.3	56 (37.3) 95% CI: 29.6 – 45.1	**<0.0001**	14 (9.3) 95% CI: 4.7 – 14.0	0.69
	Senior residents	54 (24.3) 95% CI: 18.7 – 30.0	66 (29.3) 95% CI: 23.4 – 35.3	0.29	46 (20.6) 95% CI: 15.3 – 25.9	0.30
	Attendings	13 (10.8) 95% CI: 5.3 – 16.4	--	--	--	--

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Appendix 2. Assessment of construct validity

Measure	Junior resident (JR) baseline, N (%)	Senior resident (SR) baseline, N (%)	Attending (A) baseline, N (%)	p value JR vs A	p value SR vs A
Screws in range	42 (28.0%)	42 (18.9%)	47 (39.2%)	0.05	0.0001
Stripped screws	22 (14.7%)	32 (14.4)	5 (4.8%)	0.01	0.009