

Supplementary Material

Comparative Analysis of Suturing Techniques in Microsurgery: An Evaluation of Speed and Efficiency for Optimal Surgical Outcomes

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Supplementary Table S1. Mean anastomosis time (seconds) by suture–knot technique and surgeon experience. Standard errors derive from the pooled error term of the split-plot repeated-measures model and are therefore identical across cells; confidence intervals use Satterthwaite degrees of freedom (14.5).

Technique	Experience	Mean (s)	Mean (min)	SE (s)	95% CI (s)
IS-CK	< 1 year	2507.17	41.79	135.81	2216.82 – 2797.52
	1–4 years	1237.50	20.62	135.81	947.15 – 1527.85
	> 4 years	716.33	11.94	135.81	425.98 – 1006.68
IS-AK	< 1 year	3698.67	61.64	135.81	3408.32 – 3989.02
	1–4 years	1926.33	32.11	135.81	1635.98 – 2216.68
	> 4 years	928.67	15.48	135.81	638.32 – 1219.02
OLS-CK	< 1 year	2482.83	41.38	135.81	2192.48 – 2773.18
	1–4 years	1251.67	20.86	135.81	961.32 – 1542.02
	> 4 years	670.67	11.18	135.81	380.32 – 961.02
OLS-AK	< 1 year	3598.67	59.98	135.81	3308.32 – 3889.02
	1–4 years	1830.17	30.50	135.81	1539.82 – 2120.52
	> 4 years	878.00	14.63	135.81	587.65 – 1168.35

Supplementary Table S2. Mean anastomosis time (seconds) before and after the standardised practice session. Standard errors derive from the pooled error term of the split-plot model; confidence intervals use Satterthwaite degrees of freedom (19.5). Paired comparisons across the nine surgeons are given in the right-hand columns.

Technique	Pre (s)	Pre (min)	Post (s)	Post (min)	SE (s)	Reduction (s)	Reduction (min)	Reduction (%)	t(8)	p	p (Bonf.)	d _z
IS-CK	1568.11	26.14	1405.89	23.43	85.24	162.2	2.70	10.3	2.62	0.030	0.122	0.87
IS-AK	2359.56	39.33	2009.56	33.49	85.24	350.0	5.83	14.8	3.54	0.008	0.031	1.18
OLS-CK	1507.11	25.12	1429.67	23.83	85.24	77.4	1.29	5.1	2.70	0.027	0.109	0.90
OLS-AK	2267.33	37.79	1937.22	32.29	85.24	330.1	5.50	14.6	4.08	0.004	0.014	1.36

Supplementary Table S3. Split-plot (mixed-design) repeated-measures analysis of variance for anastomosis time. p (GG) = probability after Greenhouse–Geisser correction ($\varepsilon = 0.344$ for technique and technique $\times$ experience; $\varepsilon = 0.499$ for technique $\times$ practice). No correction is applicable to effects with a single within-subject degree of freedom, for which sphericity holds by definition. Mauchly's test for the technique factor: $W = 0.001$, $\chi^2(5) = 46.42$, $p < 0.001$. Levene's test on the between-subject error: $p = 0.24$.

Source	SS	df	MS	F	p	p (GG)	Partial η^2
Between-subjects							
Experience	64,255,607	2	32,127,803	120.85	< 0.001	—	0.976
Error (surgeon within groups)	1,595,143	6	265,857				
Within-subjects							
Technique	8,041,393	3	2,680,464	45.48	< 0.001	< 0.001	0.883
Technique $\times$ Experience	2,691,748	6	448,625	7.61	< 0.001	0.021	0.717
Error (technique $\times$ surgeon)	1,060,922	18	58,940				
Practice	951,740	1	951,740	18.26	0.005	—	0.753
Practice $\times$ Experience	221,090	2	110,545	2.12	0.201	—	0.414
Error (practice $\times$ surgeon)	312,664	6	52,111				
Technique $\times$ Practice	235,302	3	78,434	8.30	0.001	0.012	0.580
Technique $\times$ Practice $\times$ Experience	50,936	6	8,489	0.90	0.517	0.479	0.230
Error (technique $\times$ practice $\times$ surgeon)	170,168	18	9,454				

Supplementary data files

Supplementary Data 1 — Anastomosis times (seconds) for all 72 anastomoses, with surgeon identifier, experience stratum, suture–knot technique and practice status (SPSS .sav).

Supplementary Data 2 — Scanning electron microscopy assessment scores by assessor, criterion and technique (SPSS .sav).