Table S2. Methodological characteristics of the included studies relevant to accuracy measurement.

Study	Design; setting; period	Patients / miniscrews; age; sex (F/M)	Planning imaging	Guidance	Miniscrew (Ø × length)	Pre-drilling	Site / anchorage	Operator(s)	Post-operative recording	Software; points measured	Outcome assessor
Al-Gazzawi et al. (2024) [38]	Consecutive patients; single practice, Jordan; NR	27 / 54; NR; NR	CBCT + intraoral scan (TRIOS)	3D-printed resin guide (P Pro Surgical Guide) covering palate and teeth, with depth shoulder	OrthoLox Plus (size NR)	NR	Paramedian	2 experienced operators	Intraoral scan of miniscrew heads	OnyxCeph Inspect 3D (ICP, median palatine raphe); horizontal and vertical discrepancies at the head	1 examiner; blinding NR
Brilli et al. (2024) [39] †	Prospective; Rome, Italy; Dec 2022–Feb 2024	24 / 48; 14.3 ± 2.0 y (11.1–17.8); 9/15	CBCT (Scanora 3Dx) + intraoral scan (Medit i700)	Dynamic navigation (Navident)	BENEfit, 2.3 × 9/11/13 mm, self-drilling	No	Paramedian, third palatal rugae; bicortical	1 expert operator	Post-operative CBCT	EvaluNav (automatic); entry (platform) and apex, 3D	NR
Brilli et al. (2025b) [40] †	Prospective single-arm; Rome, Italy; Nov 2022–Feb 2024	23 / 46; mean 14 y (11–17); 8/15	CBCT (Scanora 3Dx) + intraoral scan (Medit i700)	Dynamic navigation (Navident)	BENEfit, self-drilling	No (no pilot hole or punch)	Paramedian, third palatal rugae; bicortical	1 expert operator (same as [39])	Post-operative CBCT	EvaluNav (automatic); entry and apex, 3D	NR
Brilli et al. (2025a) [41] †	Randomized allocation to operators; Rome, Italy; Dec 2022–Jan 2025	72 / 144; 13.3 ± 2.5 y (9.0–17.8); 26/46	CBCT (Scanora 3Dx) + intraoral scan (Medit i700)	Dynamic navigation (Navident)	BENEfit, self-drilling	No	Paramedian, third palatal rugae; bicortical	6 operators novice to d-CAS (Gen X and Y orthodontists; Gen Z final-year students)	Post-operative CBCT	EvaluNav (automatic); entry and apex, 3D	External assessor, blinded
Hoffmann et al. (2025) [42]	RCT; Munich, Germany; May 2022–Apr 2024	40 / 80; 19.1 ± 9.7 y; 22/18	Intraoral scan (Trios 3) + lateral cephalogram (no CBCT)	SLA-printed guides: full-arch vs. skeletonized	BENEfit, 2.3 × 9 mm	No	Paramedian, T-zone	1 experienced surgeon	Intraoral scan with scan abutments	OnyxCeph TADmatch + Python; head (top) and tip, 3D	Blinded assessor
Möhlhenrich et al. (2026) [43]	RCT; Witten, Germany; Nov 2022–May 2025	30 / 60; 15.9 ± 4.8 y (9.9–31.2); balanced (n NR)	Intraoral scan (iTero Element 2) + lateral cephalogram	Pressure-moulded vs. 3D-printed guide (printed guide supported on premolars and first molar of each side)	PSM, 2.3 × ~7/9/11 mm	Yes (1.8 mm)	Median and paramedian	Experienced practitioners under supervision	Intraoral scan with scan bodies	OnyxCeph best-fit; shoulder and tip, 3D; values averaged per patient	Single examiner, blinded
Palone et al. (2026) [44]	Prospective; Ferrara, Italy; Mar–Oct 2024	20 / 52; 19.7 ± 6.8 y; 7/13	CBCT (KaVo OP 3D Pro) + intraoral scan (CS3600)	DLP-printed MAPA guide with 7 mm metal sleeves	HDC, Ø 2.0 mm, various lengths	Yes (1.3 mm)	Bi- or tricortical	2 experienced operators	Intraoral scan with scan bodies	Geomagic Control X + Rhinoceros; head and tip, 3D linear; planar angles	NR
Ronsivalle et al. (2023) [45]	Prospective, two planning software groups (allocation NR); Catania, Italy; Aug 2019–Dec 2022	20 / 40; 16.7 ± 2.1 y; 12/8	CBCT + intraoral scan	3D-printed guides planned with Blue Sky Plan vs. Dolphin	Spider Screw, Ø 2 × 9/11/13 mm	Yes	Anterior palate	2 clinicians	Intraoral scan with scan bodies and cover body	Geomagic Control X; angular deviation only	1 examiner (repeated) + second examiner for reliability; blinding NR

Study	Design; setting; period	Patients / miniscrews; age; sex (F/M)	Planning imaging	Guidance	Miniscrew (Ø × length)	Pre-drilling	Site / anchorage	Operator(s)	Post-operative recording	Software; points measured	Outcome assessor
Pozzan et al. (2022) [46]	Single-arm (prospective design not stated); Trieste, Italy; NR	33 / 64; 13.6 ± 3.5 y; 18/15	CBCT (Hyperion X9) + intraoral scan (CS3600), Viewbox	3D-printed guide, one-visit protocol (REPLICA)	BENEfit, Ø 2 × 9–11 mm	Yes (pilot hole through palatal cortex)	Paramedian; bicortical	NR	Intraoral scan with scan bodies	Geomagic Design X (cylinder axes); angular deviation only (laboratory, clinical and total steps)	NR

† Reports from the same research group and centre, with overlapping recruitment periods; participants may partly coincide. CBCT, cone-beam computed tomography; d-CAS, dynamic computer-assisted surgery; DLP, digital light processing; ICP, iterative closest point; NR, not reported; RCT, randomized controlled trial; SLA, stereolithography; y, years. Data extracted from the full texts of the included studies.