Supplementary Tables.

Supplementary Table S1. Study design, study-specific eligibility criteria and sample characteristics of the included studies.

Study	Study design	Eligibility criteria	Sample characteristics
Bita et al. 2011 [26]	retrospective, uncontrolled, repeated measures design	1.Palatine deficiency, transversal or sagittal 2.No previous orthodontic treatment 3.No general diseases	Sample size: 15 (12 Females, 3 Males) Age in years: 24.6, 19-36 (mean, range)
Rubim de Assis et al. 2010 [27]	retrospective, uncontrolled, repeated measures design	1.Transversal maxillary deficiency, with at least 5 mm of transversal discrepancy (posterior cross-bite) 2.Minimum age of 18 years old 3.No previous orthodontic therapy 4.Healthy patients	Sample size: 13 (10 Females, 3 Males) (11 Caucasian, 2 Black) Age in years: 26.5, 18-38 (mean, range)
Metzler et al. 2014 [23]	Retrospective before-after study	No history of facial surgery	Sample size: 12 (6 Females, 6 Males) Age in years: 17.3, 16-34 (mean, range)
Magnusson et al. 2013[24]	Prospective, uncontrolled, repeated measures design	Real transverse discrepancy according to Jacobs et al.	Sample size: 35 (21 Females, 14 Males) Age in years 19.7, 16.1- 43.9 (mean, range)
Ramieri et al. 2008 [25]	Prospective, uncontrolled, repeated measures design	1.Non-syndromic 2.Caucasian 3.Adult patients 4.No previous history of craniofacial injury or operation 5.Patients requiring transverse maxillary expansion (reduced maxillary width with posterior unilateral or bilateral cross-bite, with or without anterior dental crowding)	Sample size: 18 (14 Females, 4 Males) Age in years: 24, 18–35 (mean, range)
Gungor et al. 2012 [21]	Retrospective cohort	1. No previous orthodontic treatment 2. No additional fixed appliances during expansion 3. Acceptable cooperation	Sample size: 28 Group A = SARPE: 10 Females, 4 Males Age in years: 19.6 ± 2.73 (Mean ± SD) Group B =RME: 10 Females, 4 Males Age in years: 14.2 ± 0.74 (Mean ± SD)
Filho et al. 2002 [20]	Retrospective cohort	1.Caucasian adult patients 2.Diverse types of malocclusion 3.Transversemaxillary deficiency	Sample size: 23 unspecified age-gender distribution Group A = SARPE with conventional UL suture (n=11) Group B = SARPE with V-Y UL suture (n=12)
Berger et al. 1999 [22]	Retrospective cohort	1.Unilateral and bilateral posterior cross-bite 2.Caucasian	Sample size: 44 Group A (SARPE): 12 Females, 12 Males, mean age: 19.3 years Group B (RME): 9 Females, 11 Males, mean age: 8.6 years

Nada et al. 2013 [22]	Prospective NRCT	**Inclusion criteria**: 1.Skeletal maturity 2.Skeletal transverse maxillary deficiency combined with another skeletal discrepancy requiring orthognathic surgical intervention 3. No developmental deformity **Exclusion criteria**: 1.Presence of developmental deformity 2.Absence of more than four teeth in the posterior maxillary arch 3.Lips not being in rest position during the CBCT scan acquisition	Sample size:40 Group A (Hyrax): 19 Females, 6 Males, mean age ± SD: 25.4±9 Group B (TPD): 8 Females, 7 Males, mean age ± SD: 30±10
Nada et al. 2013 [19]	Prospective NRCT	**Inclusion criteria** 1. Skeletal maturity 2. Skeletal transverse maxillary deficiency > 5 mm combined with another skeletal discrepancy that required orthognathic surgical intervention 3. No developmental deformity. **Exclusion criteria** 1.Presence of developmental deformity 2.Signs of fluid accumulation in the maxillary sinuses on the CBCT images 3.Absence of more than four teeth in the posterior maxillary arch	Sample size= 32 Group A (Hyrax): 14 Females, 5 Males, mean age ± SD: 24.2±7.0 Group B (TPD): 7 Females, 6 Males, mean age ± SD: 31.9±10.0
Antonini et al. 2013 [17]	RCT	1.Indication for SARME 2.The presence of all natural anterior maxillary teeth 3.Age older than 18 years 4.No history of facial surgery, trauma, pathologies, anomalies, or syndromes involving the UL or maxilla 5.Absence of systemic or local illness that could interfere with wound healing	Sample size: 21 Group A (SARPE - Bard-Parker #15 scalpel blade): 8 Females, 3 Males, mean age: 32.7 years Group B (SARPE – monopolar electrocautery): 6 Females, 4 Males mean age: 27.5 years
Zupan et al. 2022 [28]	Retrospective, cohort	**Inclusion criteria:** Transverse discrepancy between the maxilla and mandible greater than 7 mm. **Exlusion criteria:** history and presentation of any congenital dentofacial deformity and facial asymmetries.	Sample size: 15 (8 Females, 7 Males) Age in years: 26.±9.0
Karabiber et Yilmaz 2021 [29]	Retrospective cohort	1. Patients older than 17 years, 2. Patients having TUPC and treated with unilateral SARME, 3. No history of craniofacial abnormalities or serious medical conditions, and 4. Having three-dimensional records from before and 6 5. months after the expansion	Sample size: 16 (8 Females, 8 Males) Age in years: 18.38.±1.45

Dias et al. 2021 [30]	retrospective cohort	Exclusion criteria: did not perform CBCT at the correct time, did not respect the preoperative and postoperative protocol (medication use, diet, etc), abandoned treatment for any reason, had a history of nasal septum surgery, used drugs with interference in bone metabolism (long-term corticosteroids, bisphosphonates, etc), underwent a new surgical intervention in the same place, Hyrax palatal expansion device used for expansion presented with a problem during the period of follow-up or activation, and had any syndrome that could somehow interfere with the results of the research.	Sample size: 26 Mean age: 30.58
Jesus et al. 2021 [31]	retrospective, non-randomized clinical study	I**nclusion criteria:** 1. availability of initial CBCT images (before any treatment) of subjects 2. complete skeletal maturity (confirmed by examination of the cervical vertebrae; 3. cervical vertebral maturation stage (CVMS) 4. V from the Hassel and Farman analysis, as modified by Baccetti et al. 5. patients of both sexes, 6. availability of CBCT images obtained after treatment. **Exclusion criteria:** 1. Imaging after any previous orthodontic treatment, 2. incomplete skeletal maturation 3. cleft lip and palate 4. syndromic conditions.	Sample size:36 Group 1: patients treated with MARPE :12 patients Group 2:patients treated with SARPE without a cinch, and those 12 patients Group 3: treated with SARPE with a cinch. :12 patients Age range:15-39

Supplementary Table S2. The orthognathic procedures, the expanders and the expansion protocols as well as the comparison groups for all the included studies.

Study	Orthognathic procedure	Expander	Expansion protocol	Interventions Comparator
Bita et al. 2011 [26]	LeFort I osteotomies or incomplete LeFort I osteotomies, without the osteotomy of the nasal septum, followed by midline sagittal osteotomy, alar cinch suture and alar base V-Y suture	Tooth-borne expander (unspecified type)	**Expansion starts** 5-7 days postoperatively **Expansion rate** unspecified **Expansion ends** until cross-bite is annulated **Retention** 4-6 months	Only SARPE (uncontrolled study)

Rubim de Assis et al. 2010 [27]	Subtotal Le Fort I osteotomy without nasal septum osteotomy nor pterygomaxillary disjunction, followed by midline sagittal osteotomy and a V-Y suture	Tooth-borne expander (Hyrax)	**Expansion starts** 5 days postoperatively with 1 mm expansion at day 1 **Expansion rate** twice daily (0.5mm/d) for 6 days; pause for 5 days; twice daily (0.5mm/d) for 7 days **Expansion ends** no cross-bite **Retention** at least 4 months with Hyrax, then replaced by URA for a total of 6 months	Only SARPE (uncontrolled study)
Metzler et al. 2014 [23]	Subtotal Le Fort I osteotomy including the pterygomaxillary junction, followed by midline sagittal osteotomy, alar cinch suture and alar base V-Y suture	Tooth-borne expander (Haas type)	**Expansion starts** 5 days postoperatively **Expansion rate** twice daily (1mm/d) **Expansion ends** 3 mm overcorrection **Retention** at least 12 weeks	Only SARPE (uncontrolled study)
Magnusson et al. 2013 [24]	Le Fort I osteotomy without pterygomaxillary disjunction, followed by midline sagittal osteotomy. Neither alar cinch suture or V- Y sutures performed	Tooth-borne expander (Hyrax)	**Expansion starts** 5 days postoperatively **Expansion rate** twice daily (0.5 mm/d) **Expansion ends** bilateral overexpansion of half a molar-cusp width **Retention** 90 days	Only SARPE (uncontrolled study)
Ramieri et al. 2008 [25]	Le Fort I osteotomy, with the pterygomaxillary disjunction, followed by midline sagittal osteotomy. No report on either alar cinch suture or V-Y sutures	Bone-anchored distraction device (Surgi-Tec NV, Brugge, Belgium)	**Expansion starts** 7 days postoperatively **Expansion rate** once daily (0.33 mm/d for 7 days; 0.6 mm/d thereafter) **Expansion ends** the active expansion required 2-3 weeks (until the amount of width increase required was achieved) **Retention** 4–6 months	Only bone-anchored transverse palatal distraction (uncontrolled study)
Gungor et al. 2012 [21]	Le Fort I osteotomy without pterygomaxillary disjunction, followed by midline sagittal osteotomy. Alar cinch suture and V-Y sutures performed	**Group A** Banded Hyrax **Group B** Bonded Hyrax	**Expansion starts** B: 1 mm at day 1, pause 7 days post-operative **Expansion rate** A, B: twice daily (0.5 mm/d) **Expansion ends** when palatial cusps of upper molars were on the buccal cusps of lower molar **Retention** A, B: 4 months	**Group A** SARPE vs **Group B** RME

Filho et al. 2002 [20]	Le Fort I osteotomy without pterygomaxillary disjunction, followed by midline sagittal osteotomy	Tooth-borne or bone- anchored Hyrax	Unspecified	**Group A** SARPE with conventional suturing of the upper lip vs **Group B** SARPE with the simple V-Y suture of the upper lip
Berger et al. 1999 [22]	LeForte I osteotomy without pterygomaxillary disjunction. No report on either alar cinch suture or V-Y sutures	Bonded acrylic hyrax for both groups	**Expansion starts** unspecified **Expansion rate** A, B: once daily (unspecified mm/d) **Expansion ends** unspecified **Retention** A, B: 2-3 months	**Group A** SARPE Vs **Group B** RME
Nada et al. 2013 [22]	Le Fort I osteotomy, with the pterygomaxillary disjunction, followed by midline sagittal osteotomy. Neither alar cinch suture or V- Y sutures performed	A. Tooth-borne hyrax expander B. Bone-borne transpalatal distractor	**Expansion starts** 7 days postoperatively **Expansion rate** 1 mm/d **Expansion ends** the palatal cusps of the maxillary teeth touched the buccal cusps of the lower dentition **Retention** three months	**Group A** SARPE (tooth-borne hyrax expander) Vs **Group B** SARPE (bone-borne transpalatal distractor)
Nada et al. 2013 [19]	Le Fort I osteotomy, with the pterygomaxillary disjunction, followed by midline sagittal osteotomy. Neither alar cinch suture or V-Y sutures performed	A. Tooth-borne hyrax expander B. Bone-borne transpalatal distractor	**Expansion starts** 7 days postoperatively **Expansion rate** 1 mm/d **Expansion ends** the palatal cusps of the maxillary teeth touched the buccal cusps of the lower dentition **Retention** three months	**Group A** SARPE (tooth-borne hyrax expander) Vs **Group B** SARPE (bone-borne transpalatal distractor)
Antonini et al. 2013 [17]	Le Fort I osteotomy without nasal septum osteotomy and pterygoid plate separation, followed by midline sagittal osteotomy, a simple alar cinch and a V-Y suture	Unspecified	Unspecified	**Group A** SARPE (Bard-Parker #15 scalpel blade) vs **Group B** SARPE (monopolar electrocautery)
Zupan et al. 2022 [28]	Subtotal LeFort I osteotomy with an additional median osteotomy of the maxilla and the palate. Osteotomy lines were carried out as in regular LeFort I with complete disjunction in the pterygomaxillary fissure; the only difference was leaving the posterior aspect of the lateral nasal wall around descending palatine artery intact	bone-borne palatal distractor (DePuy Synthes)	**Expansion starts** 7 days postoperatively **Expansion rate** once daily (0.33 mm/d) **Expansion ends** Unspecified **Retention** 4 months	Only SARME (uncontrolled study)

Karabiber et Yilmaz 2021 [29]	anterior, lateral, and posterior osteotomies on the C side and osteotomy of the midpalatal suture.	asymmetrically designed appliance with a hyrax screw.(Hyrax®, Dentaurum, Ispringen, Germany)	**Expansion starts** Unspecified **Expansion rate** Twice daily (0.5 mm/d) **Expansion ends** An average of 3 weeks **Retention** 6months	Only SARME (uncontrolled study)
Dias et al. 2021 [30]	osteotomy through the zygomaticomaxillary pillar in the lateral wall of the maxilla to the nasal pyriform aperture on both sides, according to the technique proposed by Bays and Greco; pterygoid plaques and the nasal septum were not osteotomized; a vertical incision was made on the labial frenum ; medial osteotomy between the central incisors	Tooth-borne expander (Hyrax)	**Expansion starts** 7 days postoperatively **Expansion rate** Twice daily (1 mm/d) **Expansion ends** Unspecified **Retention** 6months	Only SARME (uncontrolled study)
Jesus et al. 2021 [31]	pterygomaxillary disjunction; midpalatal suture osteotomy, and lateral osteotomy followed or not by an alar base cinch.	Bone anchored RME	**Expansion starts** Group A:Immediately after mini implant placement Group B: 7 days postoperatively **Expansion rate** Group A:Twice daily (0.5 mm/d) Group B: once daily (0.2mm/day) **Expansion ends** Group A:14-18days Group B:until cross bite correction was achieved **Retention** 4 months	Group A Miniscrew-assisted rapid palatal expansion (MARPE) Group B surgically assisted rapid palatal expansion (SARPE) with/without an alar base cinch.

Supplementary Figure S1. Graphical summary of the bias analysis for the RCT [17].