



Supplementary Figure 1. Plot of the meta-analysis of the proposed optimal incisal position. **A**, Antero-posterior position of lower incisors related to A-Pog. **B**, Bucco-lingual angulation of lower incisors related to MP. Dots indicate the mean and bars indicate the standard deviation.

Supplementary Table 1. List of abbreviations and definitions

	Abbreviation	Name	Definition	
Points	S	Sella	Midpoint of the cavity of Sella Turcica	
	N	Nasion	Most anterior point of the intersection between the nasal and frontal bones	
	A	A point	Innermost point on the contour of the premaxilla between ANS and maxillary incisors	
	B	B point	Innermost point on the contour of the mandible between the lower incisors and the bony chin	
	Pog	Pogonion	Most anterior point on the contour of the chin	
	Pog'	Soft tissue Pogonion	Most anterior point on the contour of the soft tissue chin	
	ANS	Anterior nasal spine	Most anterior point of the basal bone of the maxilla	
	PNS	Posterior nasal spine	Most posterior point of the basal bone of the maxilla	
	Me	Menton	Most inferior point on the body of the chin	
	Me'	Soft tissue Menton	Most inferior point on the body of the soft tissue chin	
	Go	Gonion	The point at middle of the curvature of the mandibular angle	
	Go'	Soft tissue Gonion	The point at middle of the curvature of the mandibular angle along the soft tissues	
	Gn	Gnathion	The most anterior and inferior point of the body of the chin	
	Sn	Subnasale	The point at which the nasal septum forms an angle with the philtrum	
	Po	Porion	The most superior point of the external auditory meatus	
	Or	Orbitale	The most inferior point of the inferior margin of the orbit	
	Lines	MP	Mandibular plane	Line connecting Go and Me or Go and Gn
		FH	Frankfurt horizontal plane	Line connecting Po to Or
		SN	Sella-Nasion line	Line connecting S to N
		NA	Nasion-A line	Line connecting A to N
NB		Nasion-B line	Line connecting B to N	
A-Pog		A-Pogonion line	Line connecting A to Pog	
OP		Occlusal plane	Line connecting the incisal edges to the tips of the occluding surfaces of the posterior teeth	
HR		Horizontal line	Horizontal line related to photographic position with the head placed in the aesthetic position	
TVL		True vertical line	Line perpendicular to natural head posture	
Sn-Pog'		Subnasale-Soft Tissue Pogonion line	Line connecting Sn to Pog'	
MC		Coronal plane contacting the pupils	Coronal plane passing tangent to the pupils, perpendicular to true horizontal	
PNS-ANS		Posterior-anterior nasal spine	Line connecting ANS to PNS	
FAC		Facial axis of the crown	The long axis of the crown identified by the most prominent portion of the central lobe on the facial surface of the crown	
FFP		Forehead facial plane	Line perpendicular to the horizontal reference plane, drawn from soft-tissue glabella inferiorly and perpendicular to the horizontal reference plane	
FMP		Forehead midpoint plane	Line drawn from the forehead midpoint inferiorly and perpendicular to the horizontal reference plane	
MP'		Soft tissue mandibular plane	Line connecting Go' and Me'	
MA		Axial plane contacting the pupils	Axial plane passing through the pupils, parallel to true horizontal	
OJ		Overjet	Horizontal overlap of upper and lower incisors	
OB		Overbite	Vertical overlap of upper and lower incisors	

Supplementary Table 2. List of all excluded articles and reasons for exclusion

N	First author	Name of the article	Year	Journal	Reason for exclusion
1	Agrait	Repositioning an inverted maxillary central incisor using a combination of replantation and orthodontic movement: a clinical case report	2003	Pediatr Dent	Not relevant to the topic
2	Altuğ	Can forces be applied directly to the root for correction of a palatally displaced central incisor with a dilacerated root?	2019	Am J Orthod Dentofacial Orthop	Not relevant to the topic
3	Arango	Can forces be applied directly to the root for correction of a palatally displaced central incisor with a dilacerated root?	2019	Am J Orthod Dentofacial Orthop	Not relevant to the topic
4	Aslan	Effects of the reciprocal mini-chain cup appliance	2008	Eur J Orthod	Not relevant to the topic
5	Baccetti	Treatment and posttreatment craniofacial changes after rapid maxillary expansion and facemask therapy	2000	Am J Orthod Dentofacial Orthop	Not relevant to the topic
6	Badawi	Torque expression of self-ligating brackets	2008	Am J Orthod Dentofacial Orthop	Not relevant to the topic
7	Baek	Establishing the customized occlusal plane in systemized surgical treatment objectives of class III	2011	J Craniofac Surg	Not relevant to the topic
8	Baghdadi	Biomechanical analysis of initial incisor crowding alignment in the periodontally reduced mandible using the finite element method	2019	J Orofac Orthop	Not relevant to the topic
9	Battagel	Profile changes in Class II, division I malocclusions: a comparison of the effects of Edgewise and Fränkel appliance therapy	1989	Eur J Orthod	Not relevant to the topic
10	Beyer	Orthodontic space opening in patients with congenitally missing lateral incisors	2007	Angle Orthod	Not relevant to the topic
11	Bolender	Orthodontic treatment of overbite by the Tip Edge technique in conjunction with an anterior bite elevator. Part 1	2001	Orthod Fr	Not relevant to the topic
12	Bradley	Eruptive malpositioning of the mandibular permanent lateral incisors: three case reports	1990	Pediatr Dent	Not relevant to the topic
13	Brockmeyer	Removable thermoplastic appliances modified by incisal cuts show altered biomechanical properties during tipping of a maxillary central incisor	2017	Prog Orthod	Not relevant to the topic
14	Bunni	Preprosthetic orthodontic preparation and Brånemark implants	1991	Cah Prostese	Not relevant to the topic
15	Burden	A cephalometric study of Class II malocclusions treated with mandibular surgery	2997	Am J Orthod Dentofacial Orthop	Not relevant to the topic
16	Carlos	Orthodontic decompensation in class III patients by means of distalization of upper molars	2009	Prog Orthod	Not relevant to the topic
17	Caruso	Impact of molar teeth distalization with clear aligners on occlusal vertical dimension: a retrospective study	2019	BMC Oral Health	Not relevant to the topic
18	Cassidy	Classification and treatment of Class II subdivision malocclusions	2014	Am J Orthod Dentofacial Orthop	Not relevant to the topic
19	Choi	Double Anterior Segmental Osteotomy Under Local Anesthesia for Correcting Adult Protrusion With Thin Alveolus and Ankylosed Tooth	2017	J Craniofac Surg	Not relevant to the topic

Supplementary Table 2. Continued

N	First author	Name of the article	Year	Journal	Reason for exclusion
20	Cozzani	Light-force technique for the early treatment of an ectopic tooth	2005	World J Orthod	Not relevant to the topic
21	Dallel	Incisor repositioning: a new approach in orthodontics	2015	Orthod Fr	Not in English language
22	Del Castillo	Conservative orthodontic-prosthodontic approach for excessive gingival display: A clinical report	2015	J Prosthet Dent	Not relevant to the topic
23	Elovikova	Biomechanical fundamentals of the dentofacial anomalies treatment	2002	Stomatologia	Not relevant to the topic
24	Fillion	Clinical advantages of the Orapix-straight wire lingual technique	2010	Int Orthod	Not relevant to the topic
25	Gallone	Multidisciplinary treatment with a customized lingual appliance for an adult patient with severe Class III malocclusion and multiple missing teeth	2019	Am J Orthod Dentofacial Orthop	Not relevant to the topic
26	Germane	Three biologic variables modifying faciolingual tooth angulation by straight-wire appliances	1989	Am J Orthod Dentofacial Orthop	Not relevant to the topic
27	Haddad	Effect of dental arch length decrease during orthodontic treatment in the upper airway development. A review	2017	Orthod Fr	Not in English language
28	Hart	The effectiveness of differential moments in establishing and maintaining anchorage	1992	Am J Orthod Dentofacial Orthop	Not relevant to the topic
29	Hemingway	The influence of bracket type on the force delivery of Ni-Ti archwires	2001	Eur J Orthod	Not relevant to the topic
30	Heo	Friction properties according to vertical and horizontal tooth displacement and bracket type during initial leveling and alignment	2011	Angle Orthod	Not relevant to the topic
31	Heravi	Effects of crown-root angle on stress distribution in the maxillary central incisors' PDL during application of intrusive and retraction forces: a three-dimensional finite element analysis	2013	Prog Orthod	Not relevant to the topic
32	Islam	Orthodontic Management of A Young Girl with Class II DivI Malocclusion	2015	Mymensingh Med J	Not relevant to the topic
33	Jacobs	Principles of orthodontic mechanics in orthognathic surgery cases	1983	Am J Orthod	Not relevant to the topic
34	Jang	Locating the center of resistance of maxillary anterior teeth retracted by Double J Retractor with palatal miniscrews	2010	Angle Orthod	Not relevant to the topic
35	Jing	Nonsurgical correction of a Class III malocclusion in an adult by miniscrew-assisted mandibular dentition distalization	2013	Am J Orthod Dentofacial Orthop	Not relevant to the topic
36	Kasrovi	Occlusion: an orthodontic perspective	2000	J Calif Dent Assoc	Not relevant to the topic
37	Kess	The long-term results in orthodontic closure of a gap in the anterior teeth--the functional status	1991	Fortsschr Kieferorthop	Not in English language
38	Kim	Double-archwire mechanics using temporary anchorage devices to relocate ectopically impacted maxillary canines	2008	World J Orthod	Not relevant to the topic
39	Kim	Comparison of frictional forces during the initial leveling stage in various combinations of self-ligating brackets and archwires with a custom-designed typodont system	2008	Am J Orthod Dentofacial Orthop	Not relevant to the topic

Supplementary Table 2. Continued

N	First author	Name of the article	Year	Journal	Reason for exclusion
40	Kokich	Managing congenitally missing lateral incisors. Part I: Canine substitution	2005	J Esthet Restor Dent	Not relevant to the topic
41	Konopnicki	Total Mandibular subapical osteotomy to correct Class II with inferior alveolar retrusion	2019	Int Orthod	Not relevant to the topic
42	Koo	Comparison of the accuracy of bracket placement between direct and indirect bonding techniques	1999	Am J Orthod Dentofacial Orthop	Not relevant to the topic
43	Larson	Effectiveness of computer-assisted orthodontic treatment technology to achieve predicted outcomes	2013	Angle Orthod	Not relevant to the topic
44	Lee	Subtypes of Maxillomandibular Advancement Surgery for Patients With Obstructive Sleep Apnea	2016	J Craniofac Surg	Not relevant to the topic
45	Li	A cone-beam computed tomography study on crown-root morphology of maxillary anterior teeth in Class II, division 2 malocclusion	2016	Beijing Da Xue Xue Bao Yi Xue Ban	Not in English language
46	Lombardo	Predictability of orthodontic movement with orthodontic aligners: a retrospective study	2017	Prog Orthod	Not relevant to the topic
47	Lombardo	Optimal parameters for final position of teeth in space closure in case of a missing upper lateral incisor	2014	Prog Orthod	Not relevant to the topic
48	Lu	Analysis of distalization of lower canine by light-segmented archwire	2005	Hua Xi Kou Qiang Yi Xue Za Zhi	Not in English language
49	Lygidakis	valuation of a treatment protocol for unerupted maxillary central incisors: retrospective clinical study of 46 children	2015	Eur Arch Paediatr Dent	Not relevant to the topic
50	Machado	Influence of the Vertical Position of Maxillary Central Incisors on the Perception of Smile Esthetics Among Orthodontists and Laypersons	2013	J Esth Restor Dent	No objective parameters
51	Martinez	Orthodontic camouflage versus orthognathic surgery for class III deformity: comparative cephalometric analysis	2017	Int J Oral Maxillofac Surg	Not relevant to the topic
52	Martins	Concomitant permanent maxillary canine agenesis and transposition treated with extractions and lingual brackets	2020	Am J Orthod Dentofacial Orthop	Not relevant to the topic
53	Martorelli	A comparison between customized clear and removable orthodontic appliances manufactured using RP and CNC techniques	2013	Dent Mater	Not relevant to the topic
54	McCollum	An alternative for the correction of the Class II low mandibular plane angle	1989	Oral Surg Oral Med Oral Pathol	Not relevant to the topic
55	Miethke	Effect of variation in tooth morphology and bracket position on first and third order correction with preadjusted appliances	1999	Oral Surg Oral Med Oral Pathol	Not relevant to the topic
56	Mirabella	Substitution of impacted canines by maxillary first premolars: a valid alternative to traditional orthodontic treatment	2013	Am J Orthod Dentofacial Orthop	Not relevant to the topic
57	Monnerat	Tomographic mapping of mandibular interradicular spaces for placement of orthodontic mini-implants	2009	Am J Orthod Dentofacial Orthop	Not relevant to the topic

Supplementary Table 2. Continued

N	First author	Name of the article	Year	Journal	Reason for exclusion
58	Murchitsch	The effect of the vertical bracket position on the orthodontic finish	1990	Fortschr Kieferorthop	Not in English language
59	Munda-Lacson	Orthodontic exposure of multiple impactions: a case report	2014	Int J Orthod Milwaukee	Not relevant to the topic
60	Murphy	Experimental force analysis of the contraction utility arch wire	1982	Am J Orthod	Not relevant to the topic
61	Nagayama	Extraction treatment of a class II division 2 malocclusion with mandibular posterior discrepancy and changes in stomatognathic function	2015	Angle Orthod	Not relevant to the topic
62	Nagendraprasad	Displacement and periodontal stress analysis on palatally impacted canine - A finite element analysis.	2019	Indian J Dent Res	Not relevant to the topic
63	Oesterle	Maxillary midline diastemas: a look at the causes	1999	J Am Dent Assoc	Not relevant to the topic
64	Patel	Class II Division I Treated with Twin Block Appliance: A Case Report	2017	Int J Orthod Milwaukee	Not relevant to the topic
65	Potts	Dental and skeletal outcomes for Class II surgical-orthodontic treatment: A comparison between novice and experienced clinicians	2011	Am J Orthod Dentofacial Orthop	Not relevant to the topic
66	Potts	Dental and skeletal changes associated with Class II surgical-orthodontic treatment	2009	Am J Orthod Dentofacial Orthop	Not relevant to the topic
67	Raj	The apparent contact dimension and covariates among orthodontically treated and nontreated subjects	2009	J Esthet Restor Dent	Not relevant to the topic
68	Ren	Torque expression by active and passive self-ligating brackets in patients with four premolar extractions: A retrospective study	2020	Orthod Craniofac Res	Not relevant to the topic
69	Richardson	Congenitally missing maxillary lateral incisors and orthodontic treatment considerations for the single-tooth implant.	2001	J Can Dent Assoc	Not relevant to the topic
70	Rossouw	A longitudinal evaluation of the anterior border of the dentition	1993	Am J Orthod Dentofacial Orthop	Not relevant to the topic
71	Saelens	Therapeutic changes in extraction versus non-extraction orthodontic treatment	1998	Eur J Orthod	Not relevant to the topic
72	Sander	The modification of growth with the jumping-the-bite plate compared to other functional orthodontic appliances	1990	Fortschr Kieferorthop	Not in English language
73	Sangcharearn	Effect of Incisor Angulation on Overjet and Overbite in Class II Camouflage Treatment. A typodont study	2007	Angle Orthod	Not in humans
74	Sheera	Orthodontic treatment of localised gingival recession associated with traumatic anterior crossbite	2009	Aust Orthod	Not relevant to the topic
75	Sesemann	Interdisciplinary treatment of an end-to-end occlusion due to congenitally missing maxillary lateral incisors	2010	Compend Contin Educ Dent	Not relevant to the topic
76	Silin	The choice of the optimal plan for treating dystopia of individual teeth combined with arch defects of the maxilla	1998	Stomatologia	Not in English language
77	Stuani	Unilateral correction of space loss in the mixed dentition	2008	Pediatr Dent	Not relevant to the topic

Supplementary Table 2. Continued

N	First author	Name of the article	Year	Journal	Reason for exclusion
78	Sun	A study on the extraoral cervical traction in the treatment of skeletal Class II division 1 malocclusion in mixed dentition	2005	Shanghai Kou Qiang Yi Xue	Not relevant to the topic
79	Tahir	An assessment of treatment outcome in American Board of Orthodontics cases	1997	Am J Orthod Dentofacial Orthop	Not relevant to the topic
80	Tanne	Biomechanical responses of tooth to orthodontic forces applied at the lingual bracket positions	1992	J Osaka Univ Dent Sch	Not relevant to the topic
81	Tanne	Patterns of initial tooth displacements associated with various root lengths and alveolar bone heights	1991	Am J Orthod Dentofacial Orthop	Not relevant to the topic
82	Thiesen	Agensis of maxillary lateral incisor in an Angle Class II, Division 1 malocclusion patient	2015	Dental Press J Orthod	Not relevant to the topic
83	Tominaga	Optimal loading conditions for controlled movement of anterior teeth in sliding mechanics	2009	Angle Orthod	Not relevant to the topic
84	Troy	Comparison of incisor inclination in patients with Class III malocclusion treated with orthognathic surgery or orthodontic camouflage	2009	Am J Orthod Dentofacial Orthop	Not relevant to the topic
85	Tseng	Tooth morphometry in lingual orthodontics	2004	Kaohsiung J Med Sci	Not relevant to the topic
86	Tzemach	Early orthodontic treatment for growth modification by functional appliances-- pros and cons	2014	Refuat Hapeh Vehashinayim	Not in English language
87	Uslu	Teport of a patient with a Class II occlusion using the Begg technique to move the first molars distally	2009	World J Orthod	Not relevant to the topic
88	van der Weijden	Improvement of embouchure after correction of irregular front teeth: the case of a professional French horn player	2019	Br Dent J	Not relevant to the topic
89	Wiechmann	Herbst appliance in lingual orthodontics	2008	Am J Orthod Dentofacial Orthop	Not relevant to the topic
90	Williams	The borderline patient and conservative treatment in the late mixed dentition	1977	Am J Orthod	Not relevant to the topic
91	Williams	Lower incisor position in treatment planning	1986	J Orthod	Review of the literature
92	Wolfart	Assessment of dental appearance following changes in incisor angulation	2004	Int J Prosthodont	Not relevant to the topic