Table S1-Supplementary Table S1. PRISMA 2020 Checklist: includes details on title, abstract, introduction, methods, results, discussion, and funding, ensuring transparency and completeness in the review process.

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	Pag.1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Pag.1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Pag.1-2
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Pag. 2
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Pag.3
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	Pag. 3-4
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Pag. 3-4
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Pag. 3-4
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	Pag. 4-5
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	Pag. 4
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	Pag. 4-5
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Pag. 4-5
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	Pag. 4
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	Pag. 4
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	Pag. 4
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Pag. 4
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Pag. 4

Section and Topic	Item #	Checklist item	Location where item is reported
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	Pag. 4
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	Pag. 4
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	Pag. 4-5
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	Pag. 4-5
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Pag. 5 and 7
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Pag. 5 and 7
Study characteristics	17	Cite each included study and present its characteristics.	Pag. 8-9
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Pag 6-7
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	Pag. 5-6 and 8-9
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Pag 6-7
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	\
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	Pag 8-9
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	Pag 5-6
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Pag 6-7
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	Pag 6-7
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Pag. 10-11
	23b	Discuss any limitations of the evidence included in the review.	Pag. 11-12
	23c	Discuss any limitations of the review processes used.	Pag. 11-12
	23d	Discuss implications of the results for practice, policy, and future research.	Pag. 11-12
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Pag. 12
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Pag. 12

Section and Topic	Item #	Checklist item	Location where item is reported
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	Pag. 12
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	Pag. 12
Competing interests	26	Declare any competing interests of review authors.	Pag. 12
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	Pag. 12

Table S2-Supplementary Table S2. Detailed Description of the Surgical Technique: this supplementary table records: author and year of publication, intervention (piezotomy and/or corticocision), detailed description of the surgical technique used, amount of CR (mm - time) in study group and control group, significance of the value (P-value) of the 15 included studies.

Authors and year	Intervention	Surgical Method	Amount of CR (mm - time) Intervention Group\Side	Amount of CR Control Group\Side	P value
Abbas et al., 2016 [23]	C, P	**C** - buccal full-thickness flap - submarginal flap design (from U2 to U5) - vertical buccal cut with piezotome along M and D surface of canine root and remove M wall bone of the extraction socket of U4 - No bone graft **P** - No flap reflection - vertical buccal gingival microincisions - vertical buccal cortical cut with piezotome on M and D along M and D surface of canine root and remove M wall bone of the extraction socket of U4 - No bone graft	**C** - 2 wk: 0.50 ± 0.07 mm - 4 wk: 0.60 ± 0.07 mm - 6 wk: 0.70 ± 0.12 mm - 8 wk: 0.78 ± 0.10 mm - 10 wk: 0.94 ± 0.05 mm - 12 wk: 1.22 ± 0.08 mm **P** - 2 wk: 0.40 ± 0.07 mm - 4 wk: 0.50 ± 0.07 mm - 6 wk: 0.60 ± 0.12 mm - 8 wk: 0.70 ± 0.12 mm - 10 wk: 0.84 ± 0.05 mm - 12 wk: 0.99 ± 0.10 mm	**C** - 2 wk: 0.24 ± 0.05 mm - 4 wk: 0.34 ± 0.08 mm - 6 wk: 0.42 ± 0.08 mm - 8 wk: 0.46 ± 0.11 mm - 10 wk: 0.52 ± 0.04 mm - 12 wk: 0.58. ± 0.04 mm **P** - 2 wk: 0.25 ± 0.07 mm - 4 wk: 0.30 ± 0.08 mm - 6 wk: 0.40 ± 0.06 mm - 8 wk: 0.45 ± 0.09 mm - 10 wk: 0.55 ± 0.04 mm - 12 wk: 0.60 ± 0.04 mm	<0.001* <0.001* <0.001* <0.001* <0.001* <0.001* <0.001* <0.001* <0.001* <0.001* <0.001* <0.001*
Aboul-Ela et al., 2011 [24]	C	- buccal full-thickness flap - submarginal flap design (from U2 to U7) - corticotomy perforations with a round bur in a low-speed hand piece from U2 to M wall bone of the extract U4 - No bone graft	- 1 mo: 1.89 mm - 2 mo: 1.83 mm - 3 mo: 1.07 mm - 4 mo: 0.89 mm	- 1 mo: 0.75 mm - 2 mo: 0.86 mm - 3 mo: 0.93 mm - 4 mo: 0.85 mm	<0.01* <0.01* <0.01* <0.01*
Aksakalli et al., 2016 [25]	P	- No flap reflection - vertical interproximal incisions M and D sides of the U3 - vertical buccal cortical cut with piezotome (3 mm depth) - No bone graft	- 1 mo: 1.53 ± 0.67 mm - 2 mo: 2.90 ± 0.86 mm	- 1 mo: 0.78 ± 0.24 mm - 2 mo: 1.73 ± 0.72 mm	<0.05* <0.05*
Alfailany et al., 2023 [37]	C	- buccal and palatal full-thickness flap - submarginal flap design (from U2 to U5) - vertical buccal and palatal cortical cut with piezotome along M and D surface of canine root - No bone graft	**CTG** - 1 mo 2.79 ± 0.39 mm - 2 mo 1.89 ± 0.42 mm - 3 mo 1.05 ± 0.40 mm - 4 mo 1.08 ± 0.44 mm	**CG** - 1 mo 1.12 ± 0.16 mm - 2 mo 1.22 ± 0.32 mm - 3 mo 1.19 ± 0.31mm - 4 mo 1.52 ± 0.58 mm	<0.001* <0.001* 0.029 0.478
Alfawal et al. 2018 [26]	C,P	**C** - No flap reflection - 5 buccal gingiva perforations using the fiber tip (U3 to U5) - alveolar cortical perforations with ER: YAG laser (3 mm depth) - No bone graft **P** - No flap reflection - 2 vertical interproximal incisions D U3, M U5	**C** 1 mo 1.57 ± 0.36 2 mo 1.25 ± 0.30 3 mo 1.06 ± 0.28 4 mo 0.89 ± 0.16 **P** 1 mo 1.65 ± 0.40	**C** 1 mo 0.79 ± 0.11 2 mo 0.85 ± 0.14 3 mo 0.96 ± 0.25 4 mo 0.90 ± 0.16 **P** 1 mo 0.83 ± 0.18	<0.001* <0.001* 0.220 0.791 <0.001*

		- vertical buccal cortical cut with piezotome (3 mm depth) - No bone graft	2 mo 1.38 ± 0.32 3 mo 1.10 ± 0.29 4 mo 0.87 ± 0.11	2 mo 0.88 ± 0.14 3 mo 0.98 ± 0.22 4 mo 0.94 ± 0.09	<0.001* 0.134 0.231
Al-Naoum et al.,2014 [27]	C	- buccal and palatal full-thickness flap - horizontal and vertical (buccal and palatal) cortical cut with a fissure bur (width 2 mm) - 20 cortical perforations (buccal and palatal) with a round bur (diameter 2 mm) - No bone graft	- 1 wk: 0.739 ± 0.365 mm - 2 wk: 0.455 ± 0.402 mm - 4 wk: 0.308 ± 0.248 mm - 8 wk: 0.282 ± 0.113 mm - 12 wk: 0.243 ± 0.073 mm	- 1 wk: 0.201 ± 0.149 mm - 2 wk: 0.105 ± 0.115 mm - 4 wk: 0.095 ± 0.161 mm - 8 wk: 0.124 ± 0.061 mm - 12 wk: 0.080 ± 0.060 mm	<0.001* <0.001* <0.001* <0.001* <0.001*
Alqadasi et al.,2021 [28]	P	- No flap reflection - vertical buccal cortical cut with piezotome from D U3 to M U5 (3 mm length - 3-5 mm depth) - No bone graft	P - Baseline: 11.15 (1.22) - 2 weeks: 10.06 (0.93) - 1 mo: 9.06 (1.09) - 2 mo: 9 (1.31) - 3 mo: 8.59 (1.31	C - Baseline: 11.33 (1.72) - 2 weeks: 10.81 (1.33) - 1 mo: 10.24 (1.35) - 2 mo: 9.46 (1.63) - 3 mo: 9.32 (1.62)	> 0.05 < 0.05* < 0.05* < 0.05* > 0.05
Bakr et al, 2023 [29]	C	- No flap reflection - 6 circular holes along M and D surface of canine root with Er, Cr: YSGG (3 mm depth) - No bone graft	C - 1 mo: 0.62 ± 0.15 mm - 2 mo: 1.63 ± 0.65 mm - 3 mo: 2.46 ± 0.80 mm	C - 1 mo: 0.51 ± 0.22 mm - 2 mo: 1.42 ± 0.43 mm - 3 mo: 2.53 ± 0.76 mm	0.18 0.36 0.79
Eid et al, 2024 [30]	P	- No flap reflection - Vertical buccal interproximal incisions along M and D surface of canine root - Vertical buccal cortical cut with piezotome along M and D surface of canine root - No bone graft In SP P was performed only once, MP P was repeated 3 times	SP 1 mo 1.65 ± 0.17 mm 2 mo 1.62 ± 0.16 mm 3 mo 1.23 ± 0.09 mm MP 1 mo 1.74 ± 0.15 mm 2 mo 1.72 ± 0.15 mm 3 mo 1.22 ± 0.10 mm	SP 1 mo 0.93 ± 0.13 mm 2 mo 0.92 ± 0.10 mm 3 mo 0.92 ± 0.31 mm MP 1 mo 0.92 ± 0.12 mm 2 mo 0.92 ± 0.09 mm 3 mo 0.95 ± 0.10 mm	<0.001* <0.001* <0.001* <0.001* <0.001* <0.001*
Hawkins et al., 2022 [31]	P	- No flap reflection - vertical buccal gingival incision with a soft tissue laser - vertical buccal cortical cut with piezotome (4-5 mm long- 3 mm deep) on D surface of canine root - No bone graft	- 6 wk: 1.36 ± 0.57 mm - 12 wk: 0.86 ± 0.4 mm - 18 wk: 0.84 ± 0.62 mm	- 6 wk: 1.30 ± 0.78 mm - 12 wk: 1.07 ± 0.59 mm - 18 wk: 0.94 ± 0.48 mm	> 0.05 > 0.05 > 0.05
Jahanbakhshi et al., 2016 [32]	C	- buccal full-thickness flap (from U2 to U5) - vertical buccal cut with a high-speed drill and a round bur (depth 0.5–1 mm - length 1 cm) along D surface of canine and M U5 - 10 Spherical cortical perforations over the U4 premolar area - No bone graft	- 1 mo: 2.2 ± 0.32 mm - 2 mo: 2 ± 0.15 mm - 3 mo: 1.8 ± 0.22 mm - 4 mo: 1.4 ± 0.19 mm	- 1 mo: 1 ± 0.13 mm - 2 mo: 1.1 ± 0.23 mm - 3 mo: 1.2 ± 0.25 mm - 4 mo: 1.1 ± 0.12 mm	<0.001* <0.001* <0.001* <0.001*
Raj et al., 2020 [33]	P	- No flap reflection - vertical buccal gingival incision along M and D surface of canine root - vertical buccal cortical cut with piezotome (3 mm deep) on M and D surface of canine root - No bone graft	0-15 days: 0.78 ± 0.3 mm 0-30 days:1.54 ± 0.4 mm 0-45 days: 2.39 ± 0.5 mm 0-60 days: 3.11 ± 0.6 mm 0-75 days: 3.73 ± 0.6 mm 0-90 days: 4.25 ± 0.6 mm	0-15 days: 0.43 ± 0.3 mm 0-30 days: 0.75 ± 0.3 mm 0-45 days: 1.26 ± 0.4 mm 0-60 days: 1.84 ± 0.4 mm 0-75 days: 2.34 ± 0.4 mm 0-90 days: 2.88 ± 0.4 mm	<0.01* <0.01* <0.01* <0.01* <0.01* <0.01*

Raza et al., 2021 [34]	C	- buccal full-thickness flap - submarginal flap design (from U2 to U5) - vertical buccal cut and perforations with a round bur (along D surface of canine and M U5) - Demineralized freeze-dried bone	- 1 mo: 1.36 ± 0.33 mm - 2 mo: 0.93 ± 0.22 mm - 3 mo: 0.79 ± 0.07 mm - 4 mo: 0.72 ± 0.08 mm - 5 mo: 0.61 ± 0.22 mm - 6 mo: 0.43 ± 0.31 mm - 7 mo: 0.07 ± 0.22 mm - 8 mo: 0.00 ± 0.00 mm	- 1 mo: 0.81 ± 0.06 mm - 2 mo: 0.74 ± 0.08 mm - 3 mo: 0.75 ± 0.10 mm - 4 mo: 0.69 ± 0.06 mm - 5 mo: 0.70 ± 0.07 mm - 6 mo: 0.64 ± 0.07 mm - 7 mo: 0.49 ± 0.22 mm - 8 mo: 0.10 ± 0.22 mm	<0.05* <0.05* >0.05 >0.05 >0.05 >0.05 <0.05* >0.05
Sharma et al., 2020 [35]	C	- buccal full-thickness flap (from U2 to U5) - vertical buccal cut and perforations with a round bur (along D surface of canine and M U5) - No bone graft	- 3 wk: 1.27 ± 0.38 mm - 6 wk: 1.26 ± 0.29 mm - 9 wk: 0.66 ± 0.16 mm - 12 wk: 0.61 ± 0.18 mm - 15 wk: 0.58 ± 0.14 mm - 18 wk: 0.54 ± 0.13 mm - 21 wk: 0.52 ± 0.09 mm	- 3 wk: 0.81± 0.18 mm - 6 wk: 0.75 ± 0.09 mm - 9 wk: 0.65 ± 0.15 mm - 12 wk: 0.64 ± 0.14 mm - 15 wk: 0.59± 0.11 mm - 18 wk: 0.56± 0.13 mm - 21 wk: 0.51± 0.11mm	0.0004** 0.0001** 0.8702 0.6359 0.8421 0.5619 0.7944
Toodehzaeim et al., 2024 [36]	C	- No flap reflection - buccal gingival incision from U3 to U5 (3 mm depth) - alveolar cortical perforations with ER: YAG laser (3 mm depth) - No bone graft	- 1 mo: 2.36 ± 0.30 mm - 2 mo: 1.58 ± 0.41 mm - 3 mo: 0.81± 0.37 mm - 4 mo: 0.40± 0.15 mm	- 1 mo: 1.05 ± 0.64 mm - 2 mo: 0.80 ± 0.40 mm - 3 mo: 0.66± 0.27 mm - 4 mo: 0.51± 0.24 mm	<0.05* <0.05* 0.29 0.29

Abbreviations: C, corticotomy; CTG, Corticotomy treated group; CG, control group; CR, canine retraction; D, distal; M, mesial; MAL, molar anchorage loss; Mo, month; MP, multiple piezocision; N/A, data not currently available; NiTi, nickel titanium; P, piezocision; RCT, Randomized Clinical Trial; SP, single piezocision;U1-8, upper and number of teeth; Wk, weeks.