Supplementary Table S1. Search strategy of the online databases.

Databases	Search	Search strategy
PubMed	#1	"Gingival Recession"[Mesh]
	#2	"Gingival Recession"[TW] OR "Gingival Recessions"[TW] OR "Recession, Gingival"[TW] OR "Recessions, Gingival"[TW] OR "Gingival Atrophy"[TW] OR "Gingival Atrophies"[TW] OR "Atrophy of Gingiva"[TW] OR "Gingiva Atrophies"[TW] OR "Gingiva Atrophy"[TW]
	#3 Combine	**#1 OR #2**
	#4	"Collagen"[Mesh]
	#5	"Collagen"[TW] OR "Avicon"[TW] OR "Avitene"[TW] OR "Collagen Felt"[TW] OR "Zyderm"[TW] OR "Collastat"[TW] OR "Dermodress"[TW] OR "Microfibril Collagen Hemostat"[TW] OR "Collagen Hemostat, Microfibril"[TW] OR "Pangen"[TW] OR "alpha-Collagen"[TW] OR "alpha Collagen"[TW] OR "Collagen Fleece"[TW] OR "Collagenfleece"[TW] OR "Collagen grafting"[TW] OR "Collagen Matrix"[TW] OR "collagen membrane"[TW] OR "Collagen Membranes"[TW]
	#6 Combine	**#4 OR #5**
	#7 Combine	**#3 AND #6**
	#8 Limit	**#7 AND (alladult[Filter])**
	#9 Limit	**#8 AND (randomizedcontrolledtrial[Filter])**
	#10 Limit	**#7 AND ("Randomized Controlled Trial" [Publication Type] OR "Controlled Clinical Trial" [Publication Type] OR "Randomized Controlled Trials as Topic"[Mesh] OR "Random Allocation"[Mesh] OR "Double-Blind Method"[Mesh] OR "Single-Blind Method"[Mesh] OR "Clinical Trial" [Publication Type] OR "Clinical Trials as Topic"[Mesh] OR "Clinical Trial"[TW] OR ((singl*[TW] OR doubl*[TW] OR trebl*[TW] OR tripl*[TW]) AND (mask*[TW] OR blind*[TW])) OR "Placebos"[Mesh] OR placebo*[TW] OR random*[TW] OR "Research Design"[Mesh:NoExp]) NOT ("Animals"[Mesh] NOT "Humans"[Mesh])**
	#11 Combine	**#9 OR #10**
EMBASE	#1	"gingiva disease"/exp
	#2	"Gingival Recession":ti,ab,kw,de OR "Gingival Recessions":ti,ab,kw,de OR "Recession, Gingival":ti,ab,kw,de OR "Recessions, Gingival":ti,ab,kw,de OR "Gingival Atrophy":ti,ab,kw,de OR "Gingival Atrophies":ti,ab,kw,de OR "Atrophy of Gingiva":ti,ab,kw,de OR "Gingiva Atrophies":ti,ab,kw,de OR "Gingiva Atrophy":ti,ab,kw,de
	#3 Combine	**#1 OR #2**
	#4	"collagen"/exp

	#5	"Collagen":ti,ab,kw,de OR "Avicon":ti,ab,kw,de OR "Avitene":ti,ab,kw,de OR "Collagen Felt":ti,ab,kw,de OR "Zyderm":ti,ab,kw,de OR "Collastat":ti,ab,kw,de OR "Dermodress":ti,ab,kw,de OR "Microfibril Collagen Hemostat":ti,ab,kw,de OR "Collagen Hemostat, Microfibril":ti,ab,kw,de OR "Pangen":ti,ab,kw,de OR "alpha-Collagen":ti,ab,kw,de OR "alpha Collagen":ti,ab,kw,de OR "Collagen Fleece":ti,ab,kw,de OR "Collagenfleece":ti,ab,kw,de OR "Collagen grafting":ti,ab,kw,de OR "Collagen Matrix":ti,ab,kw,de OR "collagen membrane":ti,ab,kw,de OR "Collagen Membranes":ti,ab,kw,de
	#6 Combine	**#4 OR #5**
	#7 Combine	**#3 AND #6**
	#8 Limit	**#7 AND ([adult]/lim OR [young adult]/lim OR [middle aged]/lim OR [aged]/lim OR [very elderly]/lim)**
	#9 Limit	**#8 AND [randomized controlled trial]/lim**
Cochrane Library	#1	[mh "Gingival Recession"]
	#2	"Gingival Recession":ti,ab,kw OR "Gingival Recessions":ti,ab,kw OR "Recession, Gingival":ti,ab,kw OR "Recessions, Gingival":ti,ab,kw OR "Gingival Atrophy":ti,ab,kw OR "Gingival Atrophies":ti,ab,kw OR "Atrophy of Gingiva":ti,ab,kw OR "Gingiva Atrophies":ti,ab,kw OR "Gingiva Atrophy":ti,ab,kw
	#3 Combine	**#1 OR #2**
	#4	[mh "Collagen"]
	#5	"Collagen":ti,ab,kw OR "Avicon":ti,ab,kw OR "Avitene":ti,ab,kw OR "Collagen Felt":ti,ab,kw OR "Zyderm":ti,ab,kw OR "Collastat":ti,ab,kw OR "Dermodress":ti,ab,kw OR "Microfibril Collagen Hemostat":ti,ab,kw OR "Collagen Hemostat, Microfibril":ti,ab,kw OR "Pangen":ti,ab,kw OR "alpha-Collagen":ti,ab,kw OR "alpha Collagen":ti,ab,kw OR "Collagen Fleece":ti,ab,kw OR "Collagenfleece":ti,ab,kw OR "Collagen grafting":ti,ab,kw OR "Collagen Matrix":ti,ab,kw OR "collagen membrane":ti,ab,kw OR "Collagen Membranes":ti,ab,kw
	#6 Combine	**#4 OR #5**
	#7 Combine	**#3 AND #6**

Supplementary Table S2. Excluded studies from full-text reading.

Reasons for exclusion	References
Not found [60, 61].	1. Nahas, R., et al. (2017). "Treatment of multiple gingival recessions with collagen matrix compared with connective tissue graft: non-inferiority randomized clinical trial." Journal of dental research 96 (Spec IssA) [60]. 2. Di Domenico, G.L., et al. (2023). "Treatment of multiple adjacent gingival recessions with coronally advanced flap versus modified coronally advanced

	tunnel with a volumetrically stable collagen matrix: a 12-months randomized controlled clinical trial." Int J Periodontics Restorative Dent [61].
Difference in sampling with respect to the purpose of this study [45, 46, 50, 62-67].	
No transplantation performed in the control group [62, 63] [50, 66, 67].	1. Jepsen, K.J., et al. (2013) "Treatment of gingival recession defects with a coronally advanced flap and a xenogeneic collagen matrix: a multicenter randomized clinical trial." J Clin Periodontol 40(1):82-89 [62]. 2. Cardaropoli, D.T. et al. (2014) "Coronally advanced flap with and without a xenogenic collagen matrix in the treatment of multiple recessions: a randomized controlled clinical study." Int J Periodontics Restorative Dent 34(3):s97-s102 [63]. 3. Rotundo, R.G., et al. (2018) "Adjunctive benefit of a xenogenic collagen matrix associated with coronally advanced flap for the treatment of multiple gingival recessions: A superiority, assessor-blind, randomized clinical trial." J Clin Periodontol 46(10):1013-1023 [66]. 4. Kadkhodazadeh, M.A., et al (2021). "Clinical efficacy of gingival thickening following the use of allogeneic acellular and xenogeneic collagen matrix: A 12-month randomized clinical trial." Int J Periodontics Restorative Dent 41(2): e63-e71 [67]. 5. Tavelli, L.B., et al. (2022). "Recombinant human platelet-derived growth factor improves root coverage of a collagen matrix for multiple adjacent gingival recessions: A triple-blinded, randomized, placebo-controlled trial." J Clin Periodontol 49(11): 1169-1184 [50].
Exclusion due to single recession [45, 65].	1. McGuire, M.K. and Scheyer, E.T. (2016) "Long-term results comparing xenogeneic collagen matrix and autogenous connective tissue grafts with coronally advanced flaps for treatment of dehiscence-type recession defects." J Periodontol 87(3):221-227 [65]. 2. Barakat, H.D.S. (2020). "Treatment of miller type I and II gingival recession defects using three-dimensional porcine collagen matrix with coronally advanced flap: A randomized clinical split-mouth trial (a 1-year follow-up)." Indian J Dent Res 31(2):209-216 [45].
A combination of single and multiple recessions [46].	1. Fathiazar, A.S.A., et al. (2022). "A comparison between Mucoderm® and connective tissue graft for root coverage." J Dent (Shiraz) 23(2): 402-409 [46].
Use of free gingival graft in the control [64].	1. McGuire, M.K. and Scheyer, E.T. (2014) "Randomized, controlled clinical trial to evaluate a xenogeneic collagen matrix as an alternative to free gingival grafting for oral soft tissue augmentation." J Periodontol 85(10):1333-1341 [64].
Possibilities of redundant cases [21]	1. Tonetti MS, Cortellini P, Pellegrini G, Nieri M, Bonaccini D, Allegri M, et al (2018). "Xenogenic collagen matrix or autologous connective tissue graft as adjunct to coronally advanced flaps for coverage of multiple adjacent gingival recession: Randomized trial assessing non-inferiority in root coverage and superiority in oral health-related quality of life". J Clin Periodontol. 2018;45:78-88 [21].
Ambiguous result [55]	1. Sanz, M., et al. (2009). "Clinical evaluation of a new collagen matrix (Mucograft prototype) to enhance the width of keratinized tissue in patients with fixed prosthetic restorations: a randomized prospective clinical trial." J Clin Periodontol 36(10): 868-876 [55].

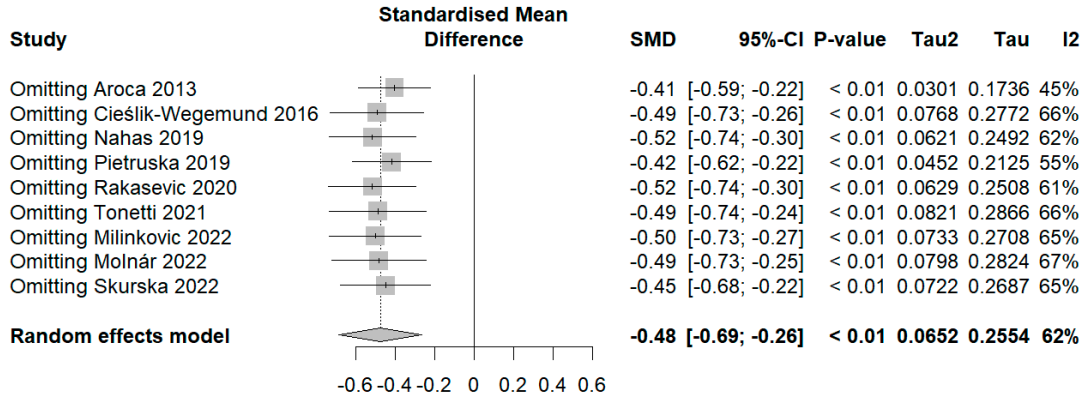
Supplementary Table S3. Risk of bias.

Study	D1: Randomization process	D2: Deviations from the intended interventions	D3: Missing outcome data	D4: Measurement of the outcome	D5: Selection of the reported result
Aroca 2013 [19]	**Low risk:** Randomization was performed by using a computer generated program (Page 715).	**Low risk:** No deviation From the Intended intervention has been reported.	**Low risk:** No dropouts were reported	**Low risk:** The following measurements were made at the mid-buccal point of the involved teeth at baseline (prior to surgery) and at 12 months by the same blinded investigator (B.M.) using the same type of periodontal probe (UNC 15, Hu-Friedy, Chicago, IL, USA) (Page 716).	**Some concerns:** No information on whether the research results were analyzed before the unblinding of the intervention outcome data.
Cieślik-Wegemund 2016 [20]	**Low risk:** Randomization was performed using a computer-generated program. The random allocation sequence was handed to another investigator (MC-W), who performed all surgical procedures on the day of surgery (Page 1438).	**Low risk:** No deviation from the intended intervention has been reported.	**Low risk:** No dropouts were reported.	**Low risk:** All preoperative and postoperative measurements were obtained by a previously calibrated examiner (LG), who was masked to the treatment assignment (Page 1438).	**Some concerns:** No information on whether the research results were analyzed before the unblinding of the intervention outcome data.

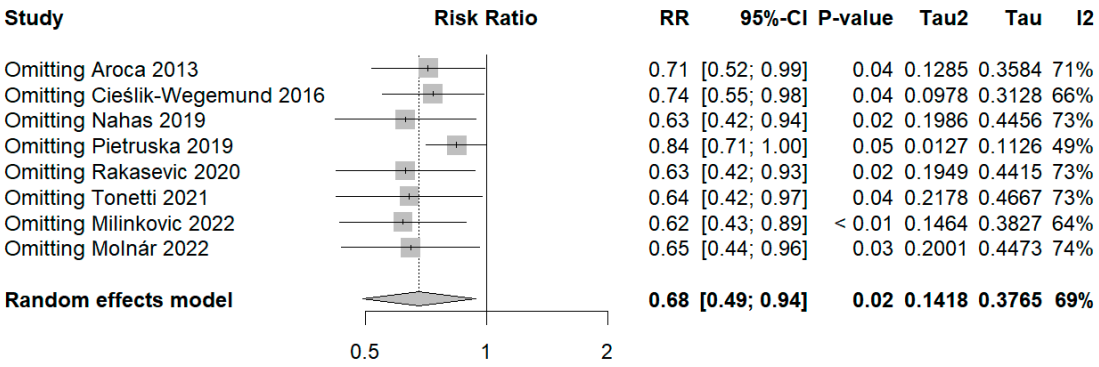
Nahas 2019 [22]	**Low risk:** The experimental sites of participants were assigned to test (CM) or control (CTG) group using a software-generated random sequence (Random Allocation Software, Microsoft Visual Basic 6, Windows) (Page 4).	**Low risk:** No deviation from the intended intervention has been reported.	**Low risk:** No dropouts were reported.	**Low risk:** Four training meetings were performed to standardize the selection of participants, measurements, and surgical procedures. The measurements were performed using a North Carolina probe (PCPUNC 15® Hu Friedy, Chicago, USA) and a standardized stent (Page 4).	**Low risk:** Clinical measurements were taken by a single blinded evaluator (EFR) that was calibrated for the primary outcome (GRD) (Page 4).
Pietruska 2019 [23]	Low risk: Allocation of treatment sites to test and control sites was done by means of a computer-generated randomization table created by a biostatistician.” ” The surgeon (M.P.) was told which procedure to perform at the specific site only after the patient had been given anesthetic (Page 87).	Low risk: No deviation from the intended intervention has been reported.	Low risk: No dropouts were reported.	Low risk: Two clinical examinations by the same examiner took place, one at baseline and the other 12 months later, with the use of periodontal probe (PCP UNC15, Hu--Friedy) (Page 88).	Some concerns: No information on whether the research results were analyzed before the unblinding of the intervention outcome data.
Rakasevic 2020 [24]	**Low risk:** The study was performed using the split-mouth design	**Low risk:** No deviation From the Intended intervention	**Low risk:** No dropouts were reported.	**Low risk**: “Two calibrated blinded examiners	**Some concerns:** No information on whether the research results

	where one side of the jaw was the test side, while the contralateral side was the control side. Randomization of the treatment sites to the test and control sides was done by using a white envelope, opened on the day of the surgery (Page 684).	has been reported.		assessed all clinical and esthetic outcomes. The first blinded examiner (DR) evaluated clinical parameters. Five patients, each having contralateral MAGR but not meeting the aforementioned inclusion criteria, were used to calibrate the examiner. The clinical measurements were assessed on two occasions, 24 hours apart." (Page 683).	were analyzed before the unblinding of the intervention outcome data.
Tonetti 2021 [25]	**Low risk:** Randomized, controlled, parallel arm, standard of care-controlled, assessor-blind, multicenter, multinational and practicebased trial (clincialtrial.gov registration NCT01440426) (Page 963)	**Low risk:** No deviation from the intended intervention has been reported	**Low risk:** Nearly all data for outcome were available.	**Low risk:** The position of the gingival margin was measured to the nearest mm with a UNC15 periodontal probe (PCP-UNC 15, Hu-Friedy) (Page 964).	**Some concerns:** No information on whether the research results were analyzed before the unblinding of the intervention outcome data.
Milinkovic 2022 [26]	**Low risk:** Gingival recession type I were randomly treated	**Low risk:** No deviation from the intended intervention has been reported	**Low risk:** No dropouts were reported.	**Some concerns:** No information is provided about measurements and methods	**Some concerns:** No information on whether the research results were analyzed before the unblinding of the

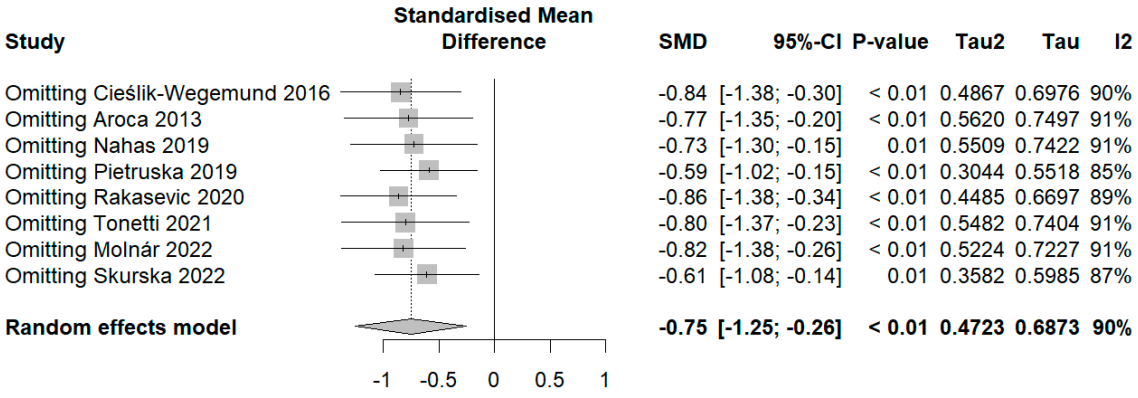
					intervention outcome data
Molnár 2022 [27]	**Low risk:** The random allocation of groups was generated using a computer program (Page 7136)	**Low risk:** No deviation from the intended intervention has been reported.	**Low risk:** Nearly all data for outcome were available.	**Low risk**: A UNC 15 type periodontal probe was used for measurements (Hu-Friedy, Chicago, IL, USA) The examiner was calibrated as discussed in original article. During surgery, the length of the procedure was measured in minutes (Page 7137).	**Some concerns:** No information on whether the research results were analyzed before the unblinding of the intervention outcome data
Skurska 2022 [28]	**Low risk:** allocation of treatment sites to test and control sites was performed by means of a computer-generated randomization table (Page 2).	Low risk: No deviation from the intended intervention has been reported.	Low risk: No dropouts were reported.	Low risk: "The same examiner (A.S.) used a periodontal probe (PCP UNC15, Hu-Friedy, Chicago, IL, USA) to conduct the clinical examinations at baseline, one year following, and five years following (Page 2).	**Some concerns:** No information on whether the research results were analyzed before the unblinding of the intervention outcome data.


Study
Standardised Mean Difference
SMD 95%-CI P-value Tau2 Tau I2
Omitting Aroca 2013 -0.41 [-0.59; -0.22] < 0.01 0.0301 0.1736 45%
Omitting Cieślik-Wegemund 2016 -0.49 [-0.73; -0.26] < 0.01 0.0768 0.2772 66%
Omitting Nahas 2019 -0.52 [-0.74; -0.30] < 0.01 0.0621 0.2492 62%
Omitting Pietruska 2019 -0.42 [-0.62; -0.22] < 0.01 0.0452 0.2125 55%
Omitting Rakasevic 2020 -0.52 [-0.74; -0.30] < 0.01 0.0629 0.2508 61%
Omitting Tonetti 2021 -0.49 [-0.74; -0.24] < 0.01 0.0821 0.2866 66%
Omitting Milinkovic 2022 -0.50 [-0.73; -0.27] < 0.01 0.0733 0.2708 65%
Omitting Molnár 2022 -0.49 [-0.73; -0.25] < 0.01 0.0798 0.2824 67%
Omitting Skurska 2022 -0.45 [-0.68; -0.22] < 0.01 0.0722 0.2687 65%
Random effects model -0.48 [-0.69; -0.26] < 0.01 0.0652 0.2554 62%
-0.6 -0.4 -0.2 0 0.2 0.4 0.6

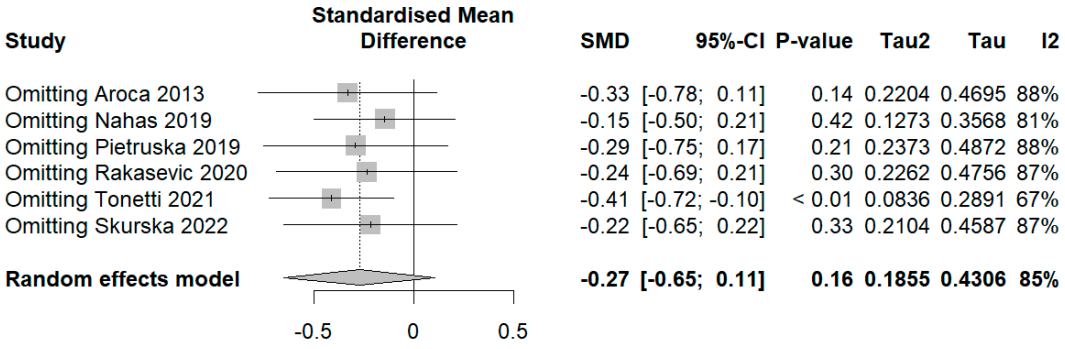
(A)


Study
Risk Ratio
RR 95%-CI P-value Tau2 Tau I2
Omitting Aroca 2013 0.71 [0.52; 0.99] 0.04 0.1285 0.3584 71%
Omitting Cieślik-Wegemund 2016 0.74 [0.55; 0.98] 0.04 0.0978 0.3128 66%
Omitting Nahas 2019 0.63 [0.42; 0.94] 0.02 0.1986 0.4456 73%
Omitting Pietruska 2019 0.84 [0.71; 1.00] 0.05 0.0127 0.1126 49%
Omitting Rakasevic 2020 0.63 [0.42; 0.93] 0.02 0.1949 0.4415 73%
Omitting Tonetti 2021 0.64 [0.42; 0.97] 0.04 0.2178 0.4667 73%
Omitting Milinkovic 2022 0.62 [0.43; 0.89] < 0.01 0.1464 0.3827 64%
Omitting Molnár 2022 0.65 [0.44; 0.96] 0.03 0.2001 0.4473 74%
Random effects model 0.68 [0.49; 0.94] 0.02 0.1418 0.3765 69%
0.5 1 2

(B)


Study
Standardised Mean Difference
SMD 95%-CI P-value Tau2 Tau I2
Omitting Cieślik-Wegemund 2016 -0.84 [-1.38; -0.30] < 0.01 0.4867 0.6976 90%
Omitting Aroca 2013 -0.77 [-1.35; -0.20] < 0.01 0.5620 0.7497 91%
Omitting Nahas 2019 -0.73 [-1.30; -0.15] 0.01 0.5509 0.7422 91%
Omitting Pietruska 2019 -0.59 [-1.02; -0.15] < 0.01 0.3044 0.5518 85%
Omitting Rakasevic 2020 -0.86 [-1.38; -0.34] < 0.01 0.4485 0.6697 89%
Omitting Tonetti 2021 -0.80 [-1.37; -0.23] < 0.01 0.5482 0.7404 91%
Omitting Molnár 2022 -0.82 [-1.38; -0.26] < 0.01 0.5224 0.7227 91%
Omitting Skurska 2022 -0.61 [-1.08; -0.14] 0.01 0.3582 0.5985 87%
Random effects model -0.75 [-1.25; -0.26] < 0.01 0.4723 0.6873 90%
-1 -0.5 0 0.5 1

(C)



(D)

Supplementary Figure S1. Forest plot illustrating the results of sensitivity tests. (A) Mean root coverage. (B) Complete root coverage. (C) Width of keratinized tissue. (D) Probing depth.