

Particulate versus collagen-stabilized deproteinized bovine bone mineral for labial bone preservation in modified periodontally accelerated osteogenic orthodontics: a retrospective CBCT study

Clinical Oral Investigations

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Online Resource 1

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No.	Recommendation	Page No.	Relevant text from manuscript
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	Manuscript, pp. 1–2	“Particulate versus collagen-stabilized deproteinized bovine bone mineral for labial bone preservation in modified periodontally accelerated osteogenic orthodontics: a retrospective CBCT study” “Retrospective cohort: 50 patients (233 mandibular anterior teeth with thin or deficient labial bone) undergoing modified PAOO before proclination received DBBM (21 patients, 98 teeth) or DBBM-C (29 patients, 135 teeth).”
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	Manuscript, p. 2	“Retrospective cohort: 50 patients (233 mandibular anterior teeth with thin or deficient labial bone) undergoing modified PAOO before proclination received DBBM (21 patients, 98 teeth) or DBBM-C (29 patients, 135 teeth).” “At 6 months both groups maintained a significant net gain at the middle and apical levels, and DBBM showed greater preservation of the augmented dimension at the labial middle level than DBBM-C (1.10 vs 0.70 mm; $P < 0.001$), with less postoperative loss at the cervical and middle levels (both $P < 0.01$).” “Both substitutes maintained significant labial augmentation at 6 months, but under orthodontic loading DBBM preserved the augmented dimension better, most clearly at the labial middle level.”
Introduction				
Background/rationale	2	Explain the scientific background and	Manuscript, p.	“Which substitute is grafted is a key determinant of the augmentation outcome,

		rationale for the investigation being reported	3	yet the two formulations in common use have never been compared directly under orthodontic loading.” “In PAOO, DBBM predominates and DBBM-C has been examined in only a few observational and case reports [19, 20].”
Objectives	3	State specific objectives, including any prespecified hypotheses	Manuscript, p. 3	“We therefore compared DBBM and DBBM-C in modified PAOO performed before planned labial proclination of the mandibular anterior teeth. Using cone-beam computed tomography (CBCT) at three timepoints, we asked which substitute better maintains the augmented labial dimension over 6 months of orthodontic loading and, secondarily, whether proclination is associated with the dimensional change and which patient- and tooth-level factors predict retention.”
Methods				
Study design	4	Present key elements of study design early in the paper	Manuscript, p. 4	“This retrospective cohort study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) recommendations (checklist provided as Online Resource 1).” “Because the study was retrospective, bone-substitute allocation was non-randomized and based on patient choice.”
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Manuscript, pp. 4–5	“The study was conducted at a single university-affiliated stomatology hospital in China, screening consecutive patients treated between 1 January 2020 and 31 July 2025.” “All patients underwent the same modified PAOO procedure, performed at a single center by a single experienced surgeon to minimize inter-operator variation [2, 15].” “CBCT was acquired at T0 (preoperative), T1 (immediately postoperative) and T2 (6 months postoperative) on a single unit (NewTom VGi evo; Cefla s.c., Imola, Italy; 110 kV, 17 × 19 cm field of view, 3.5–4.8 s exposure, 0.3 mm isotropic voxel size).”
Participants	6	(a) <i>Cohort study</i> —Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up <i>Case-control study</i> —Give the eligibility	Manuscript, pp. 4–5; Figure 2, p. 8	“The study was conducted at a single university-affiliated stomatology hospital in China, screening consecutive patients treated between 1 January 2020 and 31 July 2025. Eligible patients had deficient labial alveolar bone volume in the mandibular anterior region and underwent modified PAOO before planned decompensatory or compensatory labial movement, as part of combined

		criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls <i>Cross-sectional study</i>—Give the eligibility criteria, and the sources and methods of selection of participants	orthodontic—orthognathic or orthodontic-only treatment; those receiving combined treatment did not undergo orthognathic surgery within the 6-month observation window.” “Inclusion criteria: age ≥ 18 and ≤ 35 years; no previous orthodontic treatment; planned labial movement of the mandibular anterior teeth; preoperative CBCT showing thin labial bone (labial thickness < 0.5 mm) [21] or bony defect (dehiscence or fenestration); complete, clear CBCT at all three timepoints; good general health; good oral hygiene without untreated pulpal, periapical, or periodontal disease at the surgical or adjacent sites.” “Exclusion criteria: long-term corticosteroids, bisphosphonates or non-steroidal anti-inflammatory drugs that may affect bone remodeling; uncontrolled diabetes or other severe systemic disease precluding surgery; pregnancy or lactation; smoking; active periodontitis; occlusal trauma; bruxism; cleft lip/palate or maxillofacial anomaly; missing teeth; moderate-or-greater tooth rotation ($> 10^\circ$); abnormal tooth morphology; anterior restorations; or preoperative mobility of anterior teeth.” “Postoperatively, patients took antibiotics for 3–5 days and rinsed with cetylpyridinium chloride for one week; sutures were removed at 2 weeks, when orthodontic loading commenced.”
		(b) <i>Cohort study</i>—For matched studies, give matching criteria and number of exposed and unexposed <i>Case-control study</i>—For matched studies, give matching criteria and the number of controls per case	N/A Not applicable—the cohort study was not matched.
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Manuscript, pp. 4–7 “Inclusion criteria: age ≥ 18 and ≤ 35 years; no previous orthodontic treatment; planned labial movement of the mandibular anterior teeth; preoperative CBCT showing thin labial bone (labial thickness < 0.5 mm) [21] or bony defect (dehiscence or fenestration); complete, clear CBCT at all three timepoints; good general health; good oral hygiene without untreated pulpal, periapical, or periodontal disease at the surgical or adjacent sites.” “Labial vertical bone level (LaVBL) — the labial CEJ-to-crest distance; a larger

value indicates more crestal bone loss.”

“Labial horizontal bone thickness (LaCHBT, LaMHBT, LaAHBT) — bone thickness at the cervical, middle, and apical thirds of the root, recorded on the labial sides.”

“Total horizontal bone thickness (CHBT, MHBT, AHBT) — the sum of labial and lingual horizontal thickness at each level, used to offset the effect of labial tooth displacement on single-side measurements.”

“Root length (RL) — the distance from the midpoint of the line connecting the labial and lingual CEJs to the root apex on the maximum labiolingual section, recorded as a safety measure for orthodontically induced root resorption.”

“Change in proclination ($\Delta\alpha$) was computed as the difference between the long-axis-to-mandibular-plane angle at T2 and T1, derived from incisal-edge and apex coordinates on the superimposed maximum labiolingual sections (Figure 1b).”

“Retention at each labial site was defined as net augmentation at 6 months as a percentage of immediate augmentation, $(T2 - T0)/(T1 - T0) \times 100\%$.”

“Patients were grouped by the substitute used intraoperatively (DBBM or DBBM-C).”

“The bone change– $\Delta\alpha$ association was assessed by Spearman correlation and mixed models with a material interaction term.”

“Retention was modeled by mixed-effects regression on material, proclination change, sex, age and tooth type (specified a priori; patient random intercept), with tooth-type effects tested by Wald χ^2 and Bonferroni-adjusted pairwise comparisons.”

Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	<i>Manuscript, pp. 4–6; Figure 1, p. 6</i>	<i>“Age, sex, tooth type, treatment information and graft material were extracted from the clinical and operative records.”</i> <i>“CBCT was acquired at T0 (preoperative), T1 (immediately postoperative) and T2 (6 months postoperative) on a single unit (NewTom VGi evo; Cefla s.c., Imola, Italy; 110 kV, 17 × 19 cm field of view, 3.5–4.8 s exposure, 0.3 mm isotropic voxel size).”</i> <i>“Each T1 scan was oriented and superimposed onto the T0 and T2 scans using stable mandibular landmarks (point B, pogonion, menton, mental foramen, genial tubercle, gonion), so that all three timepoints shared identical measurement</i>
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planes.”

“For each mandibular incisor and canine, the maximum labiolingual section was obtained following a standardized plane-orientation protocol [22], and the following linear parameters were measured (Figure 1a)”

“All measurements were performed by a single calibrated operator blinded to group allocation and repeated after a 2-week interval, demonstrating excellent intra-rater reliability (intraclass correlation coefficients 0.92–0.98).”

“All patients underwent the same modified PAOO procedure, performed at a single center by a single experienced surgeon to minimize inter-operator variation [2, 15].”

Bias	9	Describe any efforts to address potential sources of bias	Manuscript, pp. 4–7	<i>“The study was conducted at a single university-affiliated stomatology hospital in China, screening consecutive patients treated between 1 January 2020 and 31 July 2025.”</i> <i>“All patients underwent the same modified PAOO procedure, performed at a single center by a single experienced surgeon to minimize inter-operator variation [2, 15].”</i> <i>“Each T1 scan was oriented and superimposed onto the T0 and T2 scans using stable mandibular landmarks (point B, pogonion, menton, mental foramen, genial tubercle, gonion), so that all three timepoints shared identical measurement planes.”</i> <i>“All measurements were performed by a single calibrated operator blinded to group allocation and repeated after a 2-week interval, demonstrating excellent intra-rater reliability (intraclass correlation coefficients 0.92–0.98).”</i> <i>“Between-group differences in each change score were tested with linear mixed-effects models (patient random intercept), adjusted for the corresponding earlier time-point value.”</i>
Study size	10	Explain how the study size was arrived at	Manuscript, p. 4	<i>“The study was conducted at a single university-affiliated stomatology hospital in China, screening consecutive patients treated between 1 January 2020 and 31 July 2025.”</i> <i>“Study size was determined by all consecutive eligible records in the prespecified study period; no a priori sample-size calculation was performed.”</i>

Continued on next page

Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Manuscript, pp. 6–7	“After Shapiro–Wilk test, continuous variables are reported as mean $\pm$ SD or median (Q1, Q3) and categorical variables as frequency (percentage).” “Change scores were signed so that a positive value denotes bone gain for T0 $\rightarrow$ T1 and T0 $\rightarrow$ T2 and bone loss for T1 $\rightarrow$ T2.” “Because a larger LaVBL denotes greater vertical bone loss, LaVBL change scores were computed as T0 – T1, T0 – T2 and T2 – T1, and all horizontal bone-thickness scores as T1 – T0, T2 – T0 and T1 – T2.” “Where LaCHBT change scores showed a high proportion of zero values, a generalized estimating equation (GEE; binomial, logit link, exchangeable correlation) modeled the probability of a cervical increase (>0 vs ≤ 0), with the baseline-adjusted model as primary and the unadjusted as a consistency check.”
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	Manuscript, pp. 6–7	“Patient-level baseline variables were compared with the independent-samples t or Mann–Whitney U test and categorical variables with the χ^2 or Fisher exact test.” “Because teeth were clustered within patients, baseline tooth-level measurements at T0 were compared using linear mixed-effects models with a patient random intercept.” “Within-group change was assessed with the Wilcoxon signed-rank test.” “Between-group differences in each change score were tested with linear mixed-effects models (patient random intercept), adjusted for the corresponding earlier time-point value.” “Where LaCHBT change scores showed a high proportion of zero values, a generalized estimating equation (GEE; binomial, logit link, exchangeable correlation) modeled the probability of a cervical increase (>0 vs ≤ 0), with the baseline-adjusted model as primary and the unadjusted as a consistency check.” “Retention was modeled by mixed-effects regression on material, proclination change, sex, age and tooth type (specified a priori; patient random intercept), with tooth-type effects tested by Wald χ^2 and Bonferroni-adjusted pairwise comparisons.” “No multiple-testing correction was applied, so secondary findings are

			hypothesis-generating.” “All tests were two-sided ($\alpha = 0.05$).”
	(b) Describe any methods used to examine subgroups and interactions	Manuscript, p. 7	“The bone change– $\Delta\alpha$ association was assessed by Spearman correlation and mixed models with a material interaction term.” “Retention was modeled by mixed-effects regression on material, proclination change, sex, age and tooth type (specified a priori; patient random intercept), with tooth-type effects tested by Wald χ^2 and Bonferroni-adjusted pairwise comparisons.”
	(c) Explain how missing data were addressed	Manuscript, p. 7	“Retention was undefined when immediate augmentation was zero (those teeth excluded), reducing the analyzable sample to 176 teeth at the vertical and cervical sites (LaVBL, LaCHBT), 233 at the middle (LaMHBT) and 210 at the apical (LaAHBT).” “No data were missing for the primary analyses and no imputation was performed.”
	(d) <i>Cohort study</i> —If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> —If applicable, explain how matching of cases and controls was addressed <i>Cross-sectional study</i> —If applicable, describe analytical methods taking account of sampling strategy	Manuscript, p. 4; Figure 2, p. 8	“Because eligibility required complete CBCT data at all three timepoints, patients with incomplete follow-up imaging were excluded during screening; no post-inclusion loss to follow-up occurred in the analytic cohort.”
	(e) Describe any sensitivity analyses	Manuscript, p. 7	“Where LaCHBT change scores showed a high proportion of zero values, a generalized estimating equation (GEE; binomial, logit link, exchangeable correlation) modeled the probability of a cervical increase (>0 vs ≤ 0), with the baseline-adjusted model as primary and the unadjusted as a consistency check.”
Results			
Participants	13* (a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Manuscript, p. 7; Figure 2, p. 8	“Of 81 patients screened, 31 were excluded (22 incomplete imaging, 7 periodontitis, 2 outside the age criterion), leaving 50 patients and 233 of 300 possible mandibular anterior teeth (77.7%) for analysis, with similar tooth-level exclusion rates in both groups (22.2% vs 22.4%; Figure 2).” “Twenty-one patients (98 teeth) received DBBM and 29 (135 teeth)

				DBBM-C.” “All 50 completed the fixed 6-month assessment, none was lost to follow-up, and no data were missing for the primary analyses.”
		(b) Give reasons for non-participation at each stage	Manuscript, p. 7; Figure 2, p. 8	“Of 81 patients screened, 31 were excluded (22 incomplete imaging, 7 periodontitis, 2 outside the age criterion), leaving 50 patients and 233 of 300 possible mandibular anterior teeth (77.7%) for analysis, with similar tooth-level exclusion rates in both groups (22.2% vs 22.4%; Figure 2).”
		(c) Consider use of a flow diagram	Figure 2, p. 8	“Fig. 2 Flow diagram of patient and tooth selection.” “Patient-level screening was followed by tooth-level eligibility assessment; the final analysis included 50 patients and 233 mandibular anterior teeth.”
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Manuscript, p. 7; Table 1, pp. 8–9	“Twenty-one patients (98 teeth) received DBBM and 29 (135 teeth) DBBM-C.” “The two groups were comparable in sex, age, cephalometric values, proclination change ($\Delta\alpha$ $9.92 \pm 7.44^\circ$ vs $9.29 \pm 6.01^\circ$), tooth-type distribution and all baseline labial bone dimensions (all $P > 0.05$; Table 1).” “The only significant baseline difference was a smaller total (labial plus lingual) cervical thickness in the DBBM group (CHBT 0.40 vs 0.60 mm; $P = 0.014$).”
		(b) Indicate number of participants with missing data for each variable of interest	Manuscript, p. 7	“All 50 completed the fixed 6-month assessment, none was lost to follow-up, and no data were missing for the primary analyses.”
		(c) Cohort study—Summarise follow-up time (eg, average and total amount)	Manuscript, p. 7	“All 50 completed the fixed 6-month assessment, none was lost to follow-up, and no data were missing for the primary analyses.”
Outcome data	15*	Cohort study—Report numbers of outcome events or summary measures over time	Manuscript, pp. 9–10, 13; Table 2, pp. 10–12; Figure 3, p. 12	“Both groups achieved significant labial augmentation immediately after surgery at every level (all within-group $P < 0.001$), with LaMHBt gains of 1.70 mm (DBBM) and 1.80 mm (DBBM-C).” “No between-group difference reached significance at any level (all $P > 0.25$; Table 2), establishing a comparable starting point for the 6-month comparison.” “Both groups maintained a significant net increase in labial bone

				<i>dimension at the middle and apical levels (all $P < 0.001$; Table 2)."</i> <i>"Between the immediate and 6-month scans median dimensions decreased at all labial levels (Table 2; Figure 3a-d)."</i> <i>"Root length decreased slightly but significantly from T0 to T2 in both groups (both $P < 0.001$; Table 2), with no between-group difference ($P = 0.977$)."</i>
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	N/A	Not applicable—this was a cohort study.
		Cross-sectional study—Report numbers of outcome events or summary measures	N/A	Not applicable—this was a cohort study.
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Manuscript, pp. 7, 10, 13; Table 2, pp. 10–12; Online Resource 3	"Between-group differences in each change score were tested with linear mixed-effects models (patient random intercept), adjusted for the corresponding earlier time-point value." "Where LaCHBT change scores showed a high proportion of zero values, a generalized estimating equation (GEE; binomial, logit link, exchangeable correlation) modeled the probability of a cervical increase (>0 vs ≤ 0), with the baseline-adjusted model as primary and the unadjusted as a consistency check." "Retention was modeled by mixed-effects regression on material, proclination change, sex, age and tooth type (specified a priori; patient random intercept), with tooth-type effects tested by Wald χ^2 and Bonferroni-adjusted pairwise comparisons." "DBBM showed a greater net gain than DBBM-C at LaMHBT (1.10 vs 0.70 mm; adjusted between-group difference 0.38 mm favoring DBBM, 95% CI 0.16 to 0.60, $P < 0.001$; Cohen's d 0.65 by tooth, 0.95 by patient) and at the corresponding total thickness MHBT (0.27 mm favoring DBBM, $P = 0.039$)." "teeth in the DBBM group were more likely to gain cervical bone dimension than those in the DBBM-C group (49.0% vs 22.2%)." "After adjustment for baseline LaCHBT, DBBM-C had lower odds of cervical gain (odds ratio 0.35, 95% CI 0.15 to 0.80, $P = 0.013$), with a

		similar unadjusted result.” “DBBM lost less than DBBM-C at LaCHBT (0.40 vs 0.70 mm; adjusted between-group difference 0.14 mm favoring DBBM, 95% CI 0.03 to 0.24, $P = 0.009$) and LaMHBT (0.70 vs 1.10 mm; 0.38 mm favoring DBBM, 95% CI 0.16 to 0.59, $P < 0.001$) levels; differences at other levels were not significant.” “DBBM showed significantly higher retention than DBBM-C at the LaVBL ($\beta = +107.27$ percentage points, $P = 0.010$), LaCHBT ($\beta = +59.93$, $P = 0.028$) and LaMHBT ($\beta = +30.07$, $P < 0.001$) levels, whereas LaAHBT retention did not differ between groups (Online Resource 3).”
(b) Report category boundaries when continuous variables were categorized	Manuscript, p. 7	“Where LaCHBT change scores showed a high proportion of zero values, a generalized estimating equation (GEE; binomial, logit link, exchangeable correlation) modeled the probability of a cervical increase (>0 vs ≤ 0), with the baseline-adjusted model as primary and the unadjusted as a consistency check.”
(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Manuscript, p. 10	“teeth in the DBBM group were more likely to gain cervical bone dimension than those in the DBBM-C group (49.0% vs 22.2%).” “After adjustment for baseline LaCHBT, DBBM-C had lower odds of cervical gain (odds ratio 0.35, 95% CI 0.15 to 0.80, $P = 0.013$), with a similar unadjusted result.”

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Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Manuscript, pp. 7, 12–13; Online Resources 2 and 3	“Where LaCHBT change scores showed a high proportion of zero values, a generalized estimating equation (GEE; binomial, logit link, exchangeable correlation) modeled the probability of a cervical increase (>0 vs ≤ 0), with the baseline-adjusted model as primary and the unadjusted as a consistency check.” “The bone change–$\Delta\alpha$ association was assessed by Spearman correlation and mixed models with a material interaction term.” “Retention was modeled by mixed-effects regression on material, proclination change, sex, age and tooth type (specified a priori; patient random intercept), with tooth-type effects tested by Wald χ^2 and Bonferroni-adjusted pairwise comparisons.” “Significant $\Delta\alpha \times$ graft-material interactions were observed for LaMHBT ($\beta = 0.028$, $P = 0.029$), LaAHBT ($\beta = -0.040$, $P = 0.037$) and MHBT ($\beta = 0.038$, $P = 0.012$), indicating that these associations differed between DBBM and DBBM-C (Online Resource 2).” “Tooth type showed a significant overall effect at LaMHBT ($P = 0.004$) and LaAHBT ($P = 0.048$); on Bonferroni-adjusted pairwise testing, canines retained significantly more than central incisors at LaMHBT ($P = 0.001$), with no other pairwise difference surviving correction.”
Discussion				
Key results	18	Summarise key results with reference to study objectives	Manuscript, p. 13	“In modified PAOO before labial proclination of thin-plate mandibular anterior teeth, the two substitutes produced comparable immediate augmentation, yet over 6 months of orthodontic loading DBBM held that augmentation better.” “The advantage was clearest at the labial middle level, where DBBM showed greater net gain, less postoperative loss and higher retention; at the cervical level the continuous comparison fell short of significance while the categorical and retention analyses both favored DBBM.” “What distinguished the materials was thus space maintenance under load, not initial grafting capacity.”
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Manuscript, p. 16	“First, the study was retrospective and single-center, with non-random, patient-chosen allocation; although the groups were comparable at baseline and the models were adjusted, residual confounding cannot be excluded.” “Second, the sample was one of convenience, and the labial middle level was chosen as

				the key outcome post hoc rather than pre-specified, which should temper interpretation.” “The between-group effect at that site was large and the study was adequately powered to detect it; the smaller effects at other sites were underpowered and are inconclusive rather than equivalent.” “Third, CBCT limits interpretation to contour maintenance.” “Partial-volume effects at the 0.30-mm voxel can underestimate thin plates [58], new bone cannot be distinguished from residual substitute, and the thin preoperative cortex precludes reliable density or volumetric quantification [59].”
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Manuscript, pp. 7, 13, 16	“What distinguished the materials was thus space maintenance under load, not initial grafting capacity.” “CBCT resolves the mineralized contour rather than histological bone, and a grafted contour holds both new bone and residual substitute; these differences therefore describe maintenance of the augmented dimension, not new bone formation.” “Clinically, by 6 months both materials had restored the thin baseline plate to a median labial thickness of at least 1 mm at the middle and apical levels, a dimension associated with greater periodontal stability [57].” “The DBBM advantage was concentrated at the labial middle level and amounted to roughly 0.4 mm, but its long-term periodontal benefit remains uncertain.” “At a one- or two-wall site under continuous loading, the slowly resorbing particulate may be preferred when durable space maintenance is the priority, whereas DBBM-C remains reasonable when handling is the priority, accepting somewhat greater early loss.” “No multiple-testing correction was applied, so secondary findings are hypothesis-generating.”
Generalisability	21	Discuss the generalisability (external validity) of the study results	Manuscript, p. 16	“These findings are most relevant to young adults with deficient mandibular anterior labial bone treated using this modified PAOO protocol. Generalizability to older patients, other centers, different patient populations or surgical protocols remains uncertain.”
Other information				
Funding	22	Give the source of funding and the role of the funders for the present study and, if	Manuscript, p. 17	“This work was supported by the National Natural Science Foundation of China [grant numbers 82470974 and 32400967]; the Funds of the Central Government Guiding Local

applicable, for the original study on which
the present article is based

Science and Technology Development [grant number 2023ZY1060]; the Funds of
Zhejiang Clinovation Pride; the Key Research and Development Program of Zhejiang
Province [grant number 2024C03081]; and the Medical Interdisciplinary Innovation
Program 2024, Zhejiang University School of Medicine.”

“The funders had no role in the study design; data collection, analysis, or interpretation;
preparation of the manuscript; or the decision to submit the article for publication.”

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.