Table S1. Methodological items for non-randomized studies (MINORS) instrument. Items are scored as 0 (not reported), 1 (reported but inadequate), or 2 (reported and adequate). The maximum score for non-comparative studies is 16, and for comparative studies is 24.

(1) A clearly stated aim: The question addressed should be precise and relevant in the light of available literature.
(2) Inclusion of consecutive patients: All patients potentially fir for inclusion (satisfying the criteria for inclusion) have been included in the study during the study period
(3) Prospective collection of data: Data were collected according to a protocol established before the beginning of the study.
(4) Endpoints appropriate to the aim of the study: Unambiguous explanation of the criteria used to evaluate the main outcome, which should be in accordance with the question addressed by the study. Also, the endpoints should be assessed on an intention-to-treat basis.
(5) Unbiased assessment of the study endpoint: Blind evaluation of objective endpoints and double-blind evaluation of subjective endpoints. Otherwise the reasons for not blinding should b stated.
(6) Follow-up period appropriate to the aim of the study: The follow-up should be sufficiently long to allow the assessment of the main endpoint and possible adverse events.
(7) Loss to follow up less than 5%: All patient should be included in the follow up. Otherwise, the proportion lost to follow up should not exceed the proportion experiencing the major endpoint.
(8) Prospective calculation of study size: Information of the size of detectable difference of interest with a calculation of 95% confidence interval, according to the expected incidence of the outcome event, and information about the level for statistical significance and estimates of power when comparing outcomes.
Additional criteria in the case of comparative studies.
(9) An adequate control group: Having a gold standard diagnostic test or therapeutic intervention recognized as the optimal intervention according to the available published data.
(10) Contemporary groups: Control and studied group should be managed during the same time period (no historical controls)
(11) Baseline equivalence of groups: The groups should be similar regarding the criteria other than the studied endpoints. Absence of confounding factors that could bias the interpretation of results.
(12) Adequate statistical analyses: Whether the statistics were in accordance with the type of study with calculation of confidence intervals or relative risk.

Table S2. Characteristics of included studies assessing methods to prevent warping in autologous costal cartilage grafts for rhinoplasty (*N*=18).

Characteristics	Frequency (%)
Year	
1996-2000	1 (5.6)
2001-2005	1 (5.6)
2006-2010	1 (5.6)
2011-2015	9 (50.0)
2016-2018	6 (33.3)
Country	
Turkey	7 (38.9)
United States	4 (22.2)
India	3 (16.7)
Taiwan	2 (11.1)
South Korea	2 (11.1)
Journal	
Aesthetic Plastic Surgery	4 (22.2)
Plastic & Reconstructive Surgery	3 (16.7)
JAMA Facial Plastic Surgery	3 (16.7)
Indian Journal of Plastic Surgery	2 (11.1)
Archives of Facial Plastic Surgery	2 (11.1)
Annals of Plastic Surgery	1 (5.6)
Annals of Maxillofacial Surgery	1 (5.6)
Journal of Craniofacial Surgery	1 (5.6)
Plastic Surgery	1 (5.6)
Funding	
None	17 (94.4)
Seoul National University Hospital	1 (5.6)
Level of Evidence	
I	0
II	0
III	8 (44.4)
IV	10 (55.6)
V	0
Type of Study	
Single intervention	15 (83.3)
Comparison of interventions	3 (16.7)
Number of Cases	
Mean (SD)	63.9 (83.9)
Range	9-357
Patient Age	
Mean (SD)	30.7 (6.3)
Range	5-95
Reason for Deformity (Absolute Number)	
Previous surgery	18 (100)

Trauma	7 (38.9)
Congenital	4 (22.2)
Tumor removal	1 (5.6)
Time From First Rhinoplasty	
Not indicated	18 (100)
Ribs Side Harvested	
Bilateral	8 (44.4)
Right side only	6 (33.3)
Left side only	2 (11.1)
Not indicated	2 (11.1)
Follow-Up Time in Months	
Mean (SD)	29.1 (37.2)
Range	1-288
MINORS Score for Non-Comparative Studies	
Mean (SD)	9.5 (1.7)
Range	6-12
MINORS Score for Comparative Studies	
Mean (SD)	19 (2)
Range	17-21

Table S3. Absolute number of methods measuring warping among studies investigating warping in autologous costal cartilage grafts for rhinoplasty (*N*=18).

Method of Warping Measurement	Frequency (%)
Visual inspection of pre- and post-operative photographs	11 (61.1)
Clinical judgement	8 (44.4)
Patient satisfaction	5 (27.8)
Nasal measurement	1 (5.6)

Table S4. Outcome related variables and MINORS scores of included studies assessing methods to prevent warping in autologous costal cartilage grafts for rhinoplasty (*N*=18).

Study	Sample Size	Study Type	Indication	Technique	Mean follow-up in months (range)	Rate of warping	MINORS Score
Agrawal et al.[9]	51	Non-comparative	Previous surgery	Counter balance technique: cartilage was split into two equal halves that had tendency to deform in opposite directions. Sutured at midline to counterbalance the warping	26 (12-48)	0%	6
Balaji et al.[10]	157	Non-comparative	Previous surgery	Costal cartilage graft: no special technique	>3	26.1%	9
Bhat et al.[11]	31	Non-comparative	Previous surgery	Carving of graft dependent on use; anticipated warping and designing accordingly	4 (1-6)	0%	11
Boyaci et al.[12]	65	Non-comparative	Previous surgery	Costal cartilage graft: no special technique	12	0%	10
Cakmak et al.[13]	20	Non-comparative	Previous surgery or trauma	Costal cartilage graft: no special technique	17 (8-32)	15%	8
Chen et al.[14]	16	Non-comparative	Previous surgery	"Chimeric graft" with bone and cartilage; bone piece at the core of the cartilage for stabilization	12.1	6%	7
Eren et al.[15]	17 (7 microplate, 4 k-wire, 5 dorsal onlay)	Comparative	Previous surgery or trauma	Titanium microplate ACCG, k-wires fixing ACCG, and dorsal onlay ACCG alone	16 (10-24) for microplate, 12 (4-18) for k-wire, 16 (12-24) for dorsal onlay	0% microplate, 0% k-wire, 100% dorsal onlay (p<0.05)	17
Gunter et al.[16]	28	Non-comparative	Previous surgery	All grafts stabilized internally with 0.028 inch smooth k-wires early in study then switched to 0.035 inch threaded k-wires later in study	13.5 (3-36)	0%	9

Guyuron et al.[17]	9	Non-comparative	Previous surgery	ACCG carved to desired shape and submerged in 15 min saline filled contained to expose warping tendencies. Then 4-0 or 5-0 PDS suture passed convex to concave on one end, then concave to convex on other. The suture is tied on the convex side with tension sufficient to straighten the cartilage.	10.5 (6.2-15.7)	0%	11
Hsiao et al.[18]	31	Non-comparative	Prior surgery, trauma, congenital, or tumor removal	"Chimeric graft" with bone and cartilage; bone piece at the core of the cartilage for stabilization	14 (4-30)	0%	8
Kridel et al.[19]	357	Non-comparative	Previous surgery or congenital	Grafts treated with gamma irradiation (15-24 kilo Grays for 1.5 to 2 hours) then stored in saline. Shaped with a scalpel or drill prior to implantation	161 (4 days-288 months)	1.1%	10
Nuara et al.[20]	11	Non-comparative	Previous surgery, congenital or trauma	Rib cartilage graft curvature is removed to create a uniform, symmetric, solid block of cartilage; cartilage graft then carved in multiplanar fashion to simulate normal nasal anatomy	16 (3-36)	0%	11
Ors et al.[21]	127	Non-comparative	Previous surgery, congenital or trauma	Rib cartilage grafts divided into three parts (upper, central, and lower 1/3) and shaped into vertical strips; shape minimally convex after being cut	72 (3-204)	6.3%	10
Ozturan et al.[22]	41(18 ACCG and	Comparative	Previous surgery,	"Accordion method": before insertion the costal cartilage was transected on 75% of its horizontal	21	0% in accordion method,	21

	23 accordion)		congenital or trauma	width every 2mm, alternating between both sides along the entire length; normal ACCG		39% in normal ACCG (p=0.001)	
Park et al.[23]	83	Non-comparative	Previous surgery	Costal cartilage graft: no special technique	29.5 (6-73)	6.1%	11
Tastan et al.[24]	43	Non-comparative	Previous surgery or first surgery	Cross sectional graft obtained through an oblique cut to the long axis of the rib	19.2 (12-37)	0%	12
Wee et al.[25]	83 (63 ACCG and 20 IHCC)	Comparative	Previous surgery	ACCG: boat shaped graft with slight concavity on undersurface, submerged in warm saline 2-3 times for at least ten minutes, then soaked in antibiotic solution (clindamycin phosphate, 300mg/l) prior to implantation; IHCC: no details on irradiation methods	25.6 (12-71) for ACCG, 38.8 (22-53) for IHCC	Obvious warping: 6% of ACCG, 10% of IHCC (p=0.35); minimal warping: 6% of ACCG, 0% of IHCC (p=0.35)	19
Yazar et al.[26]	17	Non-comparative	Previous surgery or trauma	Bone wax used to detect the shape of the defect, cartilage shaped based on the bone wax template, then fixed to upper septum and upper lateral cartilages with 5-0 polypropylene sutures	19 (8-48)	0%	10

*ACCG = autologous costal cartilage graft, IHCC = irradiated homologous costal cartilage.