

A 26-Year Evidence Map of Metabolic and Bariatric Surgery in Türkiye: A Systematic Scoping Review with Publication-Family Reconciliation

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Systematic Review

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Abstract

Background and Objectives: The literature on metabolic and bariatric surgery in Türkiye expanded substantially between 2000 and 2026; however, temporal changes in surgical procedures, clinical outcomes, and patient-level overlap caused by repeated reporting of the same cohorts have not been evaluated together. This systematic scoping review and evidence map aimed to comprehensively characterize the Turkish literature on metabolic and bariatric surgery, examine temporal changes in surgical procedures and reported weight-loss, metabolic, and safety outcomes, and estimate a conservative lower bound for unique patients represented in the literature through publication-family reconciliation.

Materials and Methods: Reports of metabolic and bariatric surgery originating from Türkiye and published between 1 January 2000 and 1 June 2026 were systematically searched and mapped. After bibliographic deduplication, eligible reports were reconciled at the publication-family level using center, author group, surgical period, procedure, and cohort characteristics. Source-patient observations, analyzed-patient observations, and reconciled unique-patient counts were maintained as separate denominator layers. Temporal changes in procedures were assessed by publication period and, in reports with adequate operation/recruitment dates, by a secondary surgery-cohort-period analysis. Randomized clinical trials (RCTs) underwent outcome-specific Cochrane RoB 2 assessment, and safety outcomes were classified according to data provenance.

Results: The final bibliographic evidence base comprised 191 unique reports, of which 177 (92.7%) were clinically/procedurally eligible and 29 were RCTs. After publication-family reconciliation, the conservative lower bound of unique patients represented in the published evidence was $\geq 27,377$. Among reports in which procedures could be reliably classified, sleeve gastrectomy (SG/LSG) was represented in 35.7% of reports published through 2015, increasing to 92.0% in 2016–2020 and remaining dominant at 88.5% in 2021–2026; laparoscopic adjustable gastric banding (LAGB) declined from 28.6% to 6.0% and then to 0%, respectively. A secondary temporal analysis of 53 reports with adequate operation/recruitment dates supported the same direction of change. Weight loss and metabolic improvement were commonly reported, whereas heterogeneity in complication denominators and data provenance precluded calculation of a reliable single national pooled safety rate.

Conclusions: The Turkish metabolic and bariatric surgery literature evolved from an early heterogeneous procedural profile to a strongly SG/LSG-dominant evidence base, with more recent diversification through bypass and newer metabolic procedures. After publication-family reconciliation, the literature represented at least 27,377 conservatively identified unique patients. Although weight loss and metabolic improvement were commonly reported, publication-family overlap and heterogeneous outcome denominators limited the generation of reliable national pooled estimates.

Key Points

- The final evidence base comprised 191 unique reports, including 177 eligible clinical reports and 29 randomized clinical trials.
- Publication-family reconciliation yielded a conservative lower bound of $\geq 27,377$ unique patients, demonstrating that bibliographic report counts do not equal independent patient cohorts.
- SG/LSG became the dominant procedure represented in the Turkish literature after 2016, while LAGB progressively disappeared.
- Heterogeneous complication denominators and data provenance precluded a reliable single national pooled safety estimate.

1. Introduction

Obesity is a major global health problem because of its increasing prevalence and its association with type 2 diabetes mellitus (T2DM), hypertension, obstructive sleep apnea, dyslipidemia, cardiovascular disease, and several malignancies. Lifestyle interventions and pharmacological treatment remain fundamental components of obesity management; however, in appropriately selected patients, metabolic and bariatric surgery has become one of the most effective treatment options for durable weight loss and control of obesity-related metabolic disease. Current ASMBS/IFSO recommendations support metabolic and bariatric surgery for individuals with a body mass index (BMI) ≥ 35 kg/m² regardless of the presence of comorbidities and recommend consideration of surgery in patients with metabolic disease and a BMI of 30–34.9 kg/m² [20].

The procedural landscape of bariatric surgery has changed substantially in recent years. The role of procedures that were previously widely used, such as laparoscopic adjustable gastric banding (LAGB), has declined, whereas sleeve gastrectomy (SG/LSG) has become one of the dominant procedures. Roux-en-Y gastric bypass (RYGB), one-anastomosis/mini-gastric bypass (OAGB/MGB), and several metabolic procedures remain important components of contemporary surgical practice according to patient characteristics, metabolic goals, and center expertise.

Türkiye has high-volume bariatric surgery centers and a broad clinical publication output covering different surgical procedures. However, the national evidence base is dispersed across internationally indexed journals, Turkish-language journals, congress abstract books, and other bibliographic sources.

An important methodological problem in the bariatric surgery literature is that identical or partially overlapping patient cohorts may be reported repeatedly to address different research questions. Primary surgical outcomes, weight loss, metabolic outcomes, complications, pregnancy, revisional surgery, or long-term quality of life from the same center may be published as separate reports derived from the same underlying patient population. Treating these reports as independent studies and directly summing their sample sizes can therefore result in repeated counting of the same patients in evidence syntheses.

Conventional bibliographic deduplication alone cannot resolve this problem. Two reports with different DOIs, titles, or publication venues may still include the same patients. Particularly in high-volume, long-

running surgical programs, reconciliation at the publication-family level is therefore needed, integrating center, author group, surgical period, procedure, and cohort characteristics.

The aim of this systematic scoping review and evidence map was to comprehensively characterize the literature on metabolic and bariatric surgery reported from Türkiye between 1 January 2000 and 1 June 2026; assess temporal changes in surgical procedures; synthesize reported outcomes related to weight loss, metabolic effectiveness, safety, revisional surgery, and special populations; and estimate a conservative lower bound of unique patients represented in the literature by controlling repeated patient reporting at the publication-family level.

Because the review question focused on mapping the scope of Turkish evidence, procedure and center distributions, study designs, clinical outcome domains, and overlap among multiple reports and cohorts rather than estimating the comparative effectiveness of a single intervention, a scoping review/evidence-mapping approach was selected. PRISMA-ScR recommends systematic mapping of the extent of evidence and explicit identification of the review type in the title [24], while JBI methodological guidance supports this approach for broad review questions and heterogeneous evidence types [25].

2. Materials and Methods

2.1. Study Design and Scope

This study was designed as a systematic scoping review and evidence map of metabolic and bariatric surgery performed in Türkiye. The review period was defined as 1 January 2000 to 1 June 2026. When available, the electronic/online-first publication date was used for eligibility assessment; otherwise, the issue or print publication date was used. Reports published after the cutoff date were excluded from the main analytical evidence base. This review was not prospectively registered.

2.2. Information Sources and Search Approach

The literature search was conducted iteratively and in multiple stages throughout the study. PubMed/MEDLINE and other international bibliographic databases and search platforms were supplemented by national journal/platform sources, congress abstract books, institutional publication records, reference and citation chaining, and targeted saturation searches of high-volume center–author publication families. Searches combined terms for metabolic/bariatric surgery and major procedures (SG/LSG, RYGB/LRYGB, OAGB/MGB/LMGB, LAGB, biliopancreatic diversion/duodenal switch, SADI-S, transit bipartition, ileal interposition, and revisional bariatric surgery) with geographic terms (Turkey/Türkiye/Turkish) and targeted the period from 1 January 2000 to 1 June 2026. Because platform-specific search histories/exports, exact run dates, and source-specific hit counts were not preserved for all historical search sessions, unverifiable historical hit counts or session details were not retrospectively reconstructed. The preserved exact PubMed query is provided in the Supplementary Search Strategy; other historical sources and complementary discovery methods are reported to the level permitted by the available audit evidence.

Data charting, study selection, publication-family adjudication, and denominator reconciliation were performed under the supervision of the lead investigator and were not conducted in parallel by two fully independent reviewers. Decisions were checked through iterative source verification and version-controlled audit records. Artificial intelligence (AI)-assisted tools were used to support publication-family matching, data-consistency checks, and editorial review; critical eligibility, denominator, inclusion/exclusion, and clinical-interpretation decisions were made by the investigator.

2.3. Bibliographic Verification and Study Selection

During the initial discovery process, 392 raw bibliographic records were archived. Because this historical archive was not generated as a single standardized database export, the 292-record difference between 392 and the historical canonical base of 100 reports could not be retrospectively assigned solely to duplicates or specific exclusion categories. The historical canonical base comprised 100 reports. Of 77 records in the Pass 1–12 candidate set, 72 were added as new eligible reports, four were controls already represented in the evidence base, and one was an excluded case report. All 18 targeted post-Pass 12 records were bibliographically unique. A final pre-submission deduplication check identified one previously missed cutoff-eligible RCT, yielding a final bibliographic evidence base of 191 reports; 177 were eligible/procedure-applicable and 14 were excluded/non-applicable [19].

2.4. Eligibility Criteria

Original clinical reports involving human participants, addressing metabolic or bariatric surgery performed in Türkiye, and meeting the publication cutoff were included. Obesity studies without bariatric/metabolic surgery, animal studies, reports limited to preoperative assessment, reviews/protocols, and publications not applicable to the clinical/procedural review question were excluded from the main analytical evidence base.

2.5. Publication-Family Reconciliation

After bibliographic deduplication, eligible reports were not assumed to represent independent patient cohorts. All reports were assessed at the publication-family level using author group, institution/center, surgical date range, procedure, index cohort, sample size, and clinical research question. ADD denoted an independent patient contribution not otherwise represented in the family ledger; NESTED denoted patients already represented within a broader publication family; and HOLD denoted eligible reports in which independence or overlap could not be resolved with sufficient confidence.

2.6. Denominator Hierarchy

Source-patient observations, analyzed-patient observations, and publication-family-reconciled unique patients were maintained as separate layers. Missing denominators were not imputed, and NR values were not treated as zero. Repeated patients were retained in the report-level source-observation layer but were not counted again in the publication-family-reconciled unique-N calculation.

2.7. Data Extraction and Outcome Variables

Bibliographic characteristics, center, surgical period, study design, procedure, source N, analyzed N, follow-up duration, and publication-family information were extracted from each report. The main outcome domains were weight loss, T2DM and hypertension remission, leak, bleeding, stenosis, DVT/VTE/PE, reoperation, mortality, revisional surgery, gastroesophageal reflux disease (GERD), nutritional outcomes, pregnancy, and quality of life.

2.8. Temporal Procedure Analysis

Temporal changes in surgical procedures were evaluated using two complementary approaches. In the primary analysis, 160 reports in which the procedure could be reliably classified were grouped by publication period (≤ 2015 , 2016–2020, and 2021–2026). In the secondary supportive analysis, 53 reports with adequate recruitment/operation dates were classified by surgical cohort period. This secondary analysis assessed whether the direction of the publication-year findings was corroborated in the subset with actual surgical-period information; it was not designed as a meta-analytic sensitivity analysis. Procedure representation in the published literature was not interpreted as national surgical market share.

2.9. Safety Outcomes and Data Provenance

Safety data were classified as DIRECT when the event count and denominator were directly verified in the source; ARM-RECOMBINED when directly reported study-arm data were descriptively combined; and PERCENTAGE-DERIVED when event counts were reconstructed from rounded published percentages. Percentage-derived event counts were not included in the main event-count synthesis.

2.10. Risk of Bias in Randomized Trials

Randomized clinical trials were assessed for a selected clinically relevant outcome using the outcome-specific Cochrane RoB 2 approach. Five domains (randomization process, deviations from intended interventions, missing outcome data, measurement of the outcome, and selection of the reported result) were assessed separately, and the overall judgment was based on domain-level evidence. Low risk/Some concerns/High risk categories were not imputed for RCTs with insufficient outcome-specific domain evidence [27]. Critical appraisal was not a primary synthesis objective or an eligibility criterion of this scoping review. RoB 2 was applied only to characterize the methodological profile of the randomized evidence subset and was not used for inclusion/exclusion decisions, quantitative weighting, or indirect grading of non-randomized reports. A single risk-of-bias tool was not imposed on the heterogeneous non-randomized evidence base.

2.11. Data Synthesis

Quantitative synthesis was considered only when studies were sufficiently clinically compatible with respect to procedure, outcome definition, and follow-up time. Reports with possible overlap within the same publication family were not repeatedly weighted as independent studies. Structured narrative synthesis was preferred when heterogeneity was substantial or denominator compatibility could not be established.

3. Results

3.1. Study Selection, Evidence Base, and Patient Representation

The final bibliographic evidence base comprised 191 unique reports. Of these, 177 (92.7%) were clinically/procedurally eligible and 14 (7.3%) were excluded/non-applicable (Figure 1). Among the 177 included reports, 29 (16.4%) were RCTs. Publication-family reconciliation classified 29 reports as ADD (16.4%), 43 as NESTED (24.3%), and 105 as HOLD (59.3%). The total number of explicitly verifiable report-level source-patient observations was $\geq 34,538$. After controlling for publication-family overlap, the conservative lower bound of unique patients was $\geq 27,377$. (Table 1).

3.2. General Characteristics of the Evidence Base

The procedure could be reliably classified in 160 of 177 reports (90.4%); procedural detail was insufficient in 17 reports (9.6%). Recruitment/operation dates were adequate for surgical-period analysis in 53 reports (29.9%). The 148 reports not classified as RCTs (84.1%) were not forced into a single observational-design category. The detailed 177-report ledger is provided in Supplementary Table S1.

3.3. Temporal Changes in Surgical Procedures

A marked temporal change was observed among the 160 reports with reliably classifiable procedures. Through 2015, SG/LSG appeared in 5/14 reports (35.7%), LAGB in 4/14 (28.6%), OAGB/MGB in 3/14 (21.4%), and RYGB in 1/14 (7.1%). During 2016–2020, SG/LSG representation increased to 46/50 (92.0%), whereas LAGB declined to 3/50 (6.0%) [11]. In 2021–2026, SG/LSG remained dominant at 85/96 (88.5%); RYGB was represented in 17/96 reports (17.7%), OAGB/MGB in 10/96 (10.4%), and newer metabolic procedures in 7/96 (7.3%), while no eligible report included LAGB. These proportions represent procedure representation within the published clinical evidence and not national surgical volume. (Table 3; Figure 2).

The secondary temporal analysis of 53 reports with adequate recruitment/operation periods supported the primary finding of SG dominance and the progressive disappearance of LAGB. Because the most recent surgical period contained relatively few reports, no inference was made regarding contemporary national procedure volume.

3.4. Weight-Loss and Metabolic Outcomes

In a large LSG series, the index cohort comprised 750 patients, and the reported mean %EWL values at 1, 3, 6, 12, and 24 months were $29.4 \pm 11.3\%$, $54.4 \pm 17.7\%$, $76.9 \pm 20.9\%$, $85.5 \pm 23.6\%$, and $89.7 \pm 27.6\%$, respectively. However, analyzed N was not reported separately at each follow-up point; therefore, the baseline N = 750 was not treated as the denominator for all follow-up time points [13].

In a comparative cohort with disease-specific denominators, T2DM remission was reported in 6/7 patients (85.7%) after RYGB, 27/28 (96.4%) after OAGB/MGB, and 29/31 (93.5%) after SG. Hypertension remission was reported in 4/5 (80.0%), 17/21 (81.0%), and 23/30 (76.7%), respectively. Because of

possible overlap within the same surgical program, these results were not reweighted as independent national pooled cohorts [14]. (Table 4).

3.5. Surgical Safety Outcomes

Safety outcomes were reported using heterogeneous source formats. In an LSG analysis cohort of 1137 patients with directly verifiable event counts and denominators, staple-line leak occurred in 1/1137 (0.09%) and DVT in 2/1137 (0.18%) [6]. In the 1356-patient LSG cohort from VM Medical Park Pendik, leak occurred in 3/1356 (0.22%) and bleeding in 13/1356 (0.96%), both directly verified from the full-text table [5]. For the same cohort, the exact reoperation count could only be reconstructed from a rounded overall percentage and was therefore retained as approximately 8/1356 (0.59%) in the PERCENTAGE-DERIVED layer. In another study, descriptive recombination of directly reported data from two treatment arms yielded leak in 2/152 (1.32%), bleeding in 3/152 (1.97%), and DVT in 1/152 (0.66%); these estimates were retained in the ARM-RECOMBINED/supportive layer. Because of this provenance heterogeneity, no single national complication rate was calculated. (Table 5).

3.6. Revisional Surgery and Selected Clinical Outcomes

In a Selçuk University cohort, 32 of 500 patients (6.4%) who underwent primary LSG subsequently underwent revisional surgery. Of the 32 revisions, 23 (71.9%) were re-sleeve procedures and 9 (28.1%) were conversions to RYGB. The revisional report was not counted as 32 additional unique patients beyond the primary LSG publication family [15].

In a pregnancy cohort, 53 pregnancies occurred after bariatric surgery: 38 after SG and 15 after RYGB. At least one miscarriage was reported in 13/38 women (34.2%) in the SG group and 14/15 (93.3%) in the RYGB group; in the adjusted model, RYGB was associated with miscarriage with an odds ratio (OR) of 29.5 (95% CI, 3.2–280). Because of the small sample and wide confidence interval, this finding was not interpreted as evidence of a causal procedural effect [16].

In a nutritional analysis of 228 patients, 12-month deficiencies were reported as vitamin D 58/228 (25%), low ferritin 32/228 (14%), iron 15/228 (7%), folate 12/228 (5.3%), and vitamin B12 11/228 (5%) [17]. In a separate quality-of-life cohort, the BAROS score was 4.23 ± 1.02 , %TWL was reported as $26.4 \pm 0.1\%$, and weight regain as 97.8% [18]. The unusually small ± 0.1 dispersion reported for %TWL appeared identically in the published abstract and journal record and was therefore retained as reported without reinterpretation. (Table 6).

3.7. Risk of Bias in Randomized Trials

Among the 177 included reports, 29 were confirmed as RCTs and bibliographically matched at the exact-publication level. An overall RoB 2 judgment could be made for 27 RCT results with sufficient outcome-specific domain evidence: 25/27 (92.6%) were rated as having some concerns, 1/27 (3.7%) as low risk, and 1/27 (3.7%) as high risk. For two RCTs, outcome-specific domain information was insufficient to assign an overall category, and no category was imputed. The most frequent sources of uncertainty were

inadequate reporting of the randomization sequence or allocation concealment, absence of a prospective protocol/statistical analysis plan or late registration, and limited information on blinding or missing outcome data in some studies. In the trial rated as high risk, long-term loss to follow-up was decisive for the selected outcome. Detailed study- and domain-level assessments are presented in Supplementary Table S2.

3.8. Representation of High-Volume Cohorts and Publication Families

Patient representation was concentrated in several high-volume surgical programs and large index cohorts (Table 2B). The 10 publications/cohorts or publication families with the highest patient representation accounted for 18,831 patients, approximately 68.8% of the conservative publication-family-reconciled unique-patient lower bound of $\geq 27,377$. This concentration reflects conservative patient representation in the published evidence and should not be interpreted as actual institutional or national surgical volume.

4. Discussion

4.1. Main Findings

This systematic scoping review and evidence map evaluated the Turkish metabolic and bariatric surgery literature from 1 January 2000 to 1 June 2026 at the levels of bibliographic report, publication family, and patient representation. The final evidence base comprised 177 eligible clinical reports among 191 unique bibliographic reports, and the conservative lower bound of unique patients after publication-family reconciliation was $\geq 27,377$. The Turkish literature evolved from an early heterogeneous procedural profile to an SG/LSG-dominant period, with more recent diversification through increasing representation of bypass and newer metabolic procedures.

4.2. Procedural Evolution

Publication-level representation of SG/LSG increased from 35.7% through 2015 to 92.0% in 2016–2020 and remained dominant at 88.5% in 2021–2026. LAGB declined from 28.6% to 6.0% and then to 0% across the same periods. This direction is consistent with international trends: in the IFSO 2020–2021 worldwide survey, SG remained the most frequently performed procedure, whereas the use of adjustable gastric banding continued to decline [21]. Nevertheless, our percentages do not represent national procedural market share and may be influenced by publication preferences, center specialization, and publication lag.

4.3. Weight Loss and Metabolic Effectiveness

Clinical reports from Türkiye commonly described substantial weight loss and metabolic improvement after metabolic/bariatric surgery. However, numerical differences in observational comparisons between procedures should not be interpreted as evidence of causal superiority. Patient selection, baseline BMI, metabolic disease burden, center experience, and procedural preference may influence outcomes. This

interpretation is consistent with long-term randomized evidence: the 10-year SLEEVEPASS follow-up demonstrated durable weight loss after both LSG and RYGB, while reflux/esophagitis burden may be greater after LSG [23].

4.4. Safety and Data Provenance

Source-level review showed that complications were reported as direct event/N data in some studies, at study-arm level in others, and only as rounded percentages in still others. DIRECT, ARM-RECOMBINED, and PERCENTAGE-DERIVED layers were therefore maintained separately. This heterogeneity precluded calculation of a reliable national pooled complication rate. Accordingly, the lack of standardized safety reporting should be regarded not only as a methodological limitation of this review but also as an important evidence gap in the Turkish bariatric surgery literature.

4.5. Revisional Surgery and Long-Term Outcomes

As SG-dominant cohorts mature, the research burden related to revisional surgery for inadequate weight loss, weight recurrence, reflux, and anatomical indications may increase. Revisional reports nested within primary cohorts provide one of the clearest examples of the risk of patient-level double counting.

4.6. Publication-Family Overlap as a Methodological Contribution

The number of bibliographic reports is not equivalent to the number of independent patient cohorts. Of the 177 eligible reports, 29 were classified as ADD, 43 as NESTED, and 105 as HOLD. The $\geq 34,538$ report-level source-patient observations represent the total data load reported across publications, whereas the $\geq 27,377$ publication-family-reconciled unique patients represent a conservative lower bound of patients who could be confidently shown to have been represented at least once in the available evidence. The latter value is not an estimate of the total number of bariatric operations performed in Türkiye. This approach is consistent with the Cochrane Handbook principle that multiple reports of the same study should be linked and treated as a single study [22].

4.7. Strengths and Limitations

Strengths of this study include a broad search extending beyond international indexes, separation of bibliographic deduplication from patient/cohort reconciliation, preservation of a denominator hierarchy, and classification of safety data by provenance. However, although the final verification and saturation phases were conducted systematically, the historical discovery archive was not generated from a prospectively preserved, fully reproducible multi-database search log; therefore, unpreserved historical hit counts and session details were not retrospectively estimated. In addition, screening, publication-family adjudication, and denominator reconciliation were not performed in parallel by two fully independent reviewers; despite iterative source verification and version-controlled audit records, reviewer-level classification error cannot be excluded. Other limitations include the predominance of single-center/observational literature, heterogeneity of outcome definitions, unresolved independence among reports classified as HOLD, and availability of actual surgical-period information in only 53 reports.

Overall RoB 2 judgments were possible for only 27 of 29 RCT results, most of which were rated as having some concerns; the presence of randomized evidence alone should therefore not be interpreted as indicating high methodological certainty. RoB 2 was used only to characterize the RCT subset and was not used as an eligibility or weighting criterion; formal risk-of-bias assessment was not applied to all non-randomized reports.

Reporting and flow terminology followed PRISMA-ScR for the scoping-review design [24], while the PRISMA 2020 framework was also considered for flow terminology [12]. Search reporting was informed by PRISMA-S principles [26]. In accordance with PRISMA-S, historical search sources were distinguished from searches for which complete session-level audit records remained available; missing historical hit counts and exact run dates were not retrospectively estimated [26].

4.8. Clinical and Research Implications

A future national metabolic and bariatric surgery registry in Türkiye should record the index procedure, primary/revisional status, operation date, baseline BMI, comorbidities, standardized weight-loss measures, metabolic remission criteria, complication classification, revision, GERD, nutritional outcomes, and long-term follow-up. Explicit reporting of possible overlap with previously published cohorts from the same center would reduce the risk of double counting in future evidence syntheses.

5. Conclusions

The Turkish metabolic and bariatric surgery literature changed substantially between 2000 and 2026 in volume, clinical scope, and procedural diversity. The final evidence base comprised 177 eligible clinical reports among 191 unique bibliographic reports, representing a conservative lower bound of $\geq 27,377$ unique patients after publication-family reconciliation. The early literature was more heterogeneous and included substantial representation of LAGB, whereas the evidence base became strongly SG/LSG-dominant after 2016. Publication-family analysis demonstrated that the number of bibliographic reports is not equivalent to the number of independent patient cohorts and that bibliographic deduplication alone may be insufficient in surgical systematic reviews. Heterogeneous complication reporting further indicates an important evidence gap for standardized national safety data.

Declarations

The final bibliographic and patient-denominator chain was maintained as $191 \rightarrow 177$ (14 excluded) $\rightarrow 29$ ADD + 43 NESTED + 105 HOLD $\rightarrow \geq 27,377$. The top-10 patient representation was 18,831 (68.8%) and was not interpreted as national surgical volume.

Registration and Protocol: This review was not prospectively registered. Eligibility, bibliographic reconciliation, and denominator rules used during the study were retained in version-controlled audit records.

Supplementary Materials: The bibliographic and publication-family ledger of the 177 included reports is provided in Supplementary Table S1; the 14 excluded/non-applicable reports and reasons for exclusion are provided in Supplementary Table S5.

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Tables

Table 1. Evidence Base and Denominator Architecture

ADD/NESTED/HOLD are not eligibility exclusion categories. $\geq 27,377$ is not the total surgical volume in Türkiye; it is a conservative lower bound of unique patients after publication-family reconciliation.

Variable	Final value
Historical discovery/audit archive	392 records
Unique bibliographic evidence base	191 reports
Eligible/procedure-applicable	177 (92.7%)
Excluded/non-applicable	14 (7.3%)
Randomized clinical trials	29/177 (16.4%)
ADD	29/177 (16.4%)
NESTED	43/177 (24.3%)
HOLD	105/177 (59.3%)
Verifiable report-level source-patient observations	≥ 34.538
Publication-family-reconciled unique patients	≥ 27.377

Table 2. Summary Characteristics of the Final Included Reports

Center structure and detailed proportions of observational study designs were not generated because complete row-level design classification had not been finalized in the 177-report ledger.

Characteristic	n	%	Comment
Included/procedure-applicable reports	177	100.0	Final denominator for included reports
Randomized clinical trials	29	16.4	Final design classification
Reports not classified as RCTs	148	83.6	Not automatically labeled observational
ADD	29	16.4	Independent patient contribution
NESTED	43	24.3	Unique-patient contribution $\Delta=0$
HOLD	105	59.3	Unique-patient contribution $\Delta=0$
Procedure-classifiable reports	160	90.4	Temporal procedure-analysis denominator
Procedure not classifiable reports	17	9.6	NR/insufficient procedure detail
Reports classifiable by surgical period	53	29.9	Supportive temporal-analysis denominator
Surgical-period information insufficient/NR	124	70.1	Surgical-period assignment not possible

Table 2B. Ten Index Cohorts/Publication Families with the Highest Conservative Patient Representation in the Published Evidence

Ranking is based on patient representation retained in the final data lock for large cohorts/publication families. N derived from a single index publication and N derived through publication-family reconciliation are not equivalent concepts; therefore, the type of N is shown separately.

Note: The represented N values indicate conservative patient representation derived either from a single large index cohort or from publication-family reconciliation, as specified in the N-type column. The source in square brackets is the representative/anchor publication for the corresponding family; a family-reconciled N should not necessarily be interpreted as the sample size of a single article. In particular, the Firat University value of 3942 and the Liv İstanbul value of 1200 resulted from reconciliation across multiple publications within the family.

Rank	Author(s)/family	Center/program	Represented N	Procedure	N type	Source
1	Ocaklı, Canlıkarakaya, Uçar, Sevim, Altunsaray, Banlı	Banlı program	4,450	LSG	Single large index publication	[1]
2	Lale, Aygen, Kırkıl, Artaş, Yur	Fırat Üniversitesi	3,942	LSG	Single large index publication	[2]
3	Kankaya, Büyükaşık, Altundal, Özgül, Etemad, Rahmanbakhsh, Güzelaltunçekic, Alış	İstanbul Aydın Üniversitesi	2,014	LSG	Single large index publication	[3]
4	Turgut, Kaplan, Okut, Cengiz, Kocaaslan, Baran, Karahan, Sümer, Aydın, Kayaalp	İnönü Üniversitesi / Turgut Özal	1,422	LRYGB + LSG	Single large index publication	[4]
5	Kara, Özel, Yardımcı	VM Medical Park Pendik	1,356	LSG	Single large index publication	[5]
6	Or Koca, Buluş	Ankara Atatürk Sanatoryum / Buluş family	1,332*	LSG	Publication-family/source cohort; 1-year analysis N=1,137	[6]
7	Batman, Altun	Liv İstanbul	1,200	LSG	Single large index publication	[7]
8	Tülübaş, Tekdoğ Şeker, Güneş, Alış	Bakırköy Dr. Sadi Konuk	≥1,107	LSG	Verified large congress stratum	[8]
9	Özgen, Çalikoğlu, Acunaş, Yerdel	İstanbul Bariatrics	1,008	SG	Single large index publication	[9]
10	Coşkun, Yardımcı	Bezmialem / İstanbul	1.000	LSG	Single large index publication	[10]
Top-10 subtotal			18,831		68.8% of ≥27.377	
Note: Represented N values indicate conservative patient representation derived either from a single large index cohort or from publication-family reconciliation, as specified in the N-type column. The source in square brackets is the representative/anchor publication for the corresponding family; a						

family-reconciled N should not necessarily be interpreted as the sample size of a single article. In particular, the Fırat University value of 3,942 and the Liv İstanbul value of 1,200 resulted from reconciliation across multiple publications within the family.

* For the Buluş family, the source/program cohort of 1332 is retained in the final ledger; the one-year analysis denominator in the Or Koca–Buluş article was 1137. The $\geq$ symbol indicates the verified minimum representation.

The top-10 rows sum to 18,831, representing approximately 68.8% of the conservative publication-family-reconciled unique-patient lower bound of $\geq 27,377$. This proportion is not a measure of national surgical volume or market share; it indicates only the concentration of conservative patient representation in the published evidence.

Table 3. Procedure Representation by Publication Period

Publication period	n	SG/LSG	RYGB	OAGB/MGB	LAGB	Metabolic	Revisional
≤ 2015	14	5 (35.7)	1 (7.1)	3 (21.4)	4 (28.6)	0	3 (21.4)
2016–2020	50	46 (92.0)	5 (10.0)	4 (8.0)	3 (6.0)	0	4 (8.0)
2021–2026	96	85 (88.5)	17 (17.7)	10 (10.4)	0	7 (7.3)	3 (3.1)

Analytical N = 160. Procedure categories are not mutually exclusive; percentages indicate procedure representation at the publication level rather than proportions of national surgical volume.

Table 4. Weight-Loss and Metabolic Effectiveness

Outcome domain	Procedure	Denominator	Follow-up	Outcome
%EWL	LSG	Baseline N=750*	1 month	29.4±11.3
%EWL	LSG	Baseline N=750*	3 months	54.4±17.7
%EWL	LSG	Baseline N=750*	6 months	76.9±20.9
%EWL	LSG	Baseline N=750*	12 months	85.5±23.6
%EWL	LSG	Baseline N=750*	24 months	89.7±27.6
T2DM remission	RYGB	7	Long term	6/7 (85.7%)
T2DM remission	OAGB/MGB	28	Long term	27/28 (96.4%)
T2DM remission	SG	31	Long term	29/31 (93.5%)
Hypertension remission	RYGB	5	Long term	4/5 (80.0%)
Hypertension remission	OAGB/MGB	21	Long term	17/21 (81.0%)
Hypertension remission	SG	30	Long term	23/30 (76.7%)

*The index cohort comprised 750 patients; because analyzed N was not separately reported at each time point, N = 750 is not the denominator for all follow-up points.

Table 5. Surgical Safety Outcomes and Data Provenance

Outcome domain	Outcome	Data-provenance class	Main synthesis
Leak	1/1137 (0.09%)	DIRECT [6]	Yes
DVT	2/1137 (0.18%)	DIRECT [6]	Yes
Leak	2/152 (1.32%)	ARM-RECOMBINED	Supportive analysis
Bleeding	3/152 (1.97%)	ARM-RECOMBINED	Supportive analysis
DVT	1/152 (0.66%)	ARM-RECOMBINED	Supportive analysis
Leak	3/1356 (0.22%)	DIRECT [5]	Yes
Bleeding	13/1356 (0.96%)	DIRECT [5]	Yes
Reoperation	≈8/1356 (0.59%)	PERCENTAGE-DERIVED [5]	No

DIRECT: event count and denominator were directly reported in the source. ARM-RECOMBINED: a descriptive sum of directly reported study arms. PERCENTAGE-DERIVED: reconstructed from rounded percentages and not included in the main event-count synthesis.

Table 6. Revisional Surgery and Selected Clinical Outcomes

Domain	Denominator	Outcome
Revision after LSG	500	32/500 (6.4%)
Re-sleeve	32 revisions	23/32 (71.9%)
Conversion to RYGB	32 revisions	9/32 (28.1%)
Miscarriage after SG	38	13/38 (34.2%)
Miscarriage after RYGB	15	14/15 (93.3%)
RYGB–miscarriage association	53 pregnancies	OR 29.5 (95% CI 3.2–280)
Vitamin D deficiency	228	58/228 (25%)
Low ferritin	228	32/228 (14%)
Iron deficiency	228	15/228 (7%)
Vitamin B12 deficiency	228	11/228 (5%)
Folate deficiency	228	12/228 (5.3%)
BAROS	45	4.23±1.02
%TWL	45	26.4±0.1 (as reported in source)
Weight regain	45	97.8% (as reported in source)

The source-reported weight-regain value of 97.8% was retained; the post hoc 44/45 event count derived from that percentage was not used in the main manuscript.

Figures

Figure 1. Bibliographic Reconstruction, Study Selection, and Publication-Family Reconciliation Flow

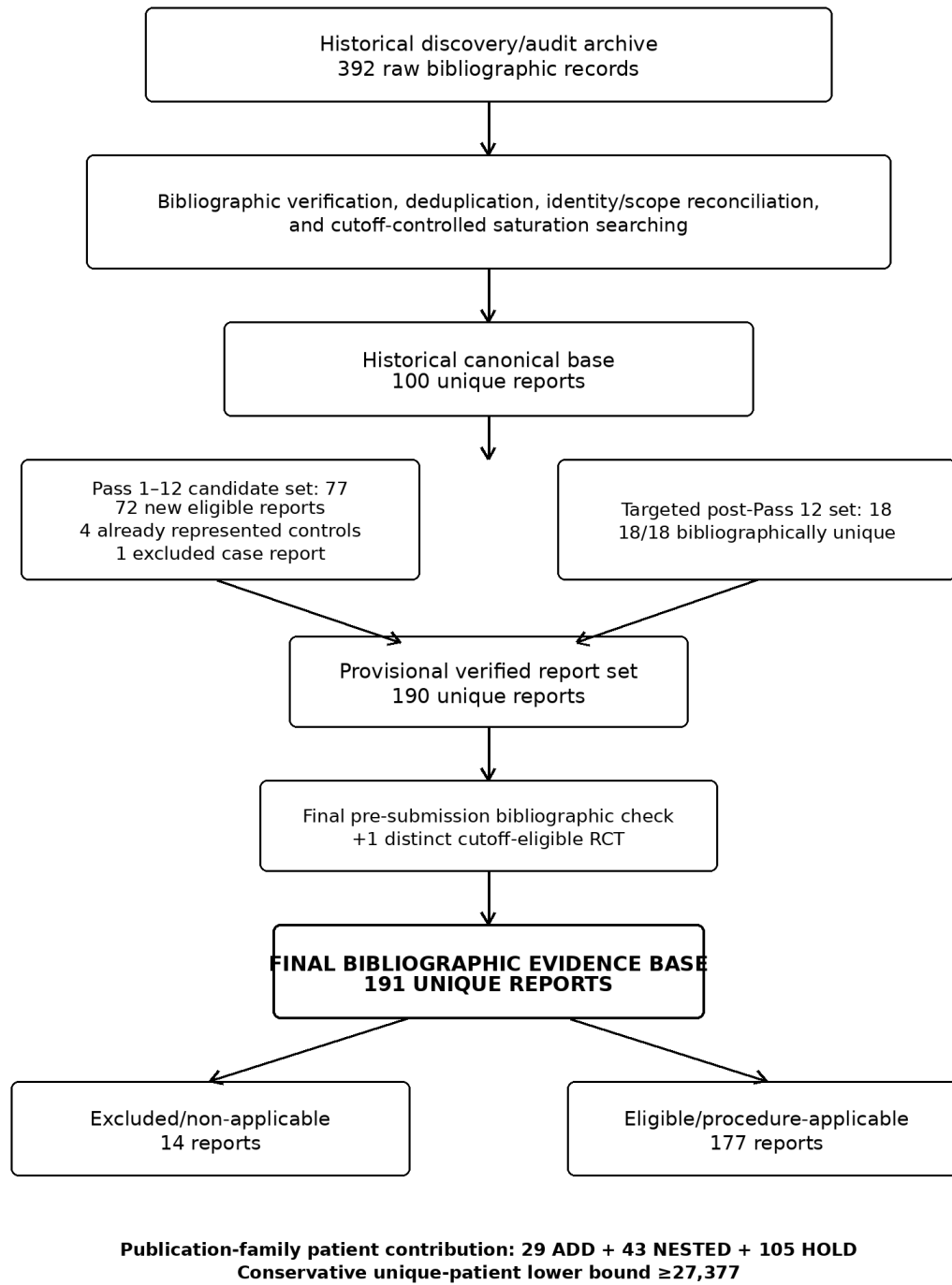


Figure 1

Bibliographic reconstruction, study selection, and publication-family reconciliation flow.

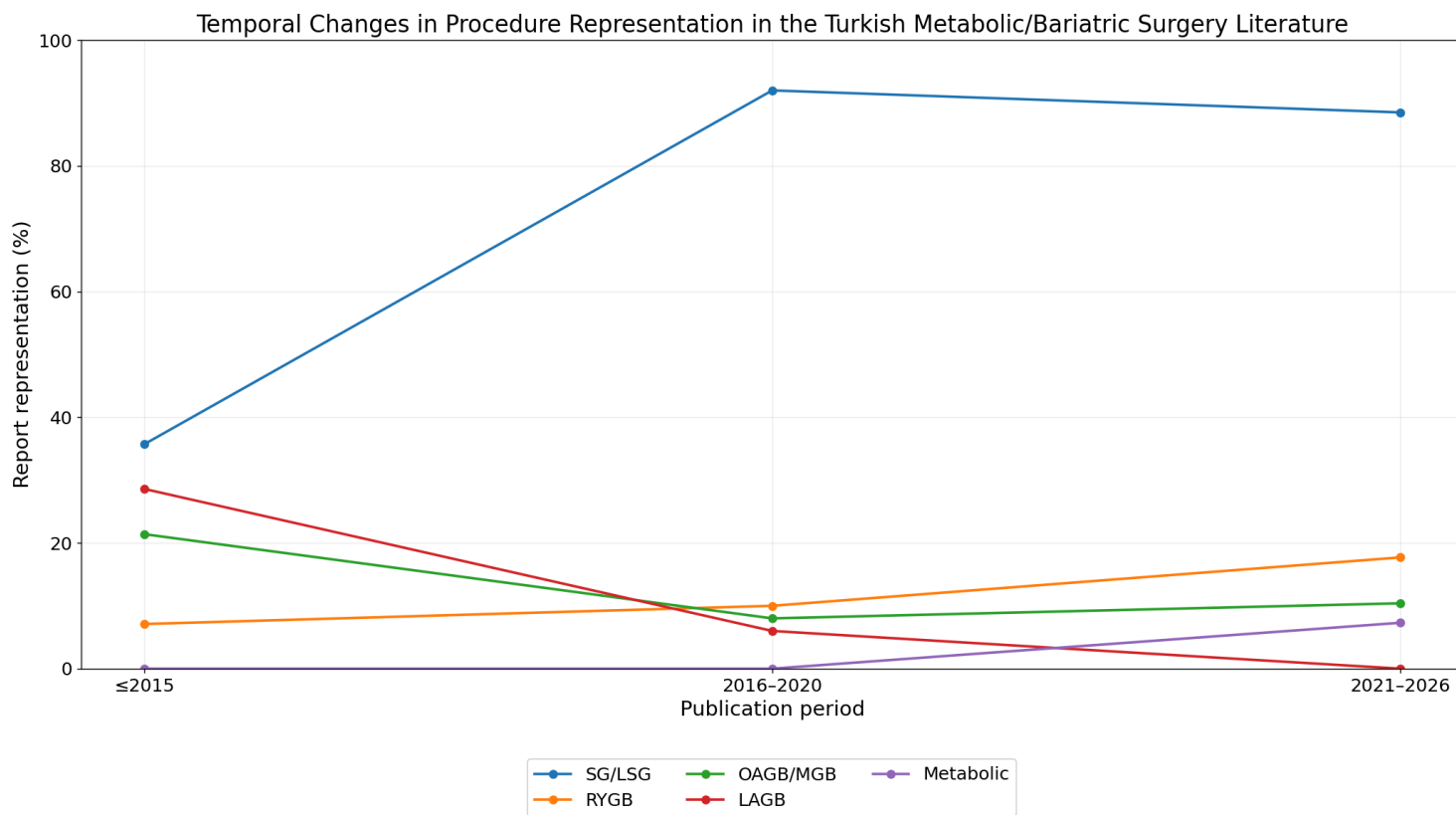


Figure 2

Temporal changes in procedure representation in the Turkish metabolic/bariatric surgery literature. Percentages represent procedure representation among classifiable reports and not national surgical volume.

Supplementary Files

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