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# Postoperative drainage pathways after parotidectomy for parotid neoplasms: a systematic review and network meta-analysis

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**ADMINISTRATIVE INFORMATION**

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**Review Stage at time of this submission -** Data extraction.

**Conflicts of interest -** None declared.

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**Amendments -** This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 14 May 2026 and was last updated on 14 May 2026.

## INTRODUCTION

**Review question / Objective** To compare postoperative drainage pathways after parotidectomy for parotid neoplasms, including drainless, strict volume-based, and time-based approaches, with respect to postoperative fluid-related complications, length of stay, hematoma, and surgical site infection.

**Rationale** No society guideline currently specifies how parotidectomy drains should be managed after surgery, and practice differs widely between surgeons and centers. In a 2023 Canadian survey, 67.9% of otolaryngologists reported routine drain use, with removal thresholds ranging from 5 to 70 mL per 24 hours. Some surgeons remove drains by output, others by postoperative day, and others by a combination of the two. These choices have plausible consequences for fluid-related morbidity, hematoma, hospital stay, and surgical site infection. Previous reviews have mainly compared drained versus drainless approaches without adequately distinguishing between specific drain-removal pathways. They have also given limited weight to the uneven use of co-interventions such as fibrin sealant and pressure dressing, which tend to cluster in the drainless arms of the published evidence. This review therefore takes a pathway-level approach to postoperative drainage after parotidectomy and aims to map what the current evidence can and cannot support.

**Condition being studied** Parotid neoplasms managed with parotidectomy, with attention to postoperative drainage management and associated postoperative outcomes.

## METHODS

**Search strategy** We searched PubMed/MEDLINE, Embase, and the Cochrane Central Register of Controlled Trials (CENTRAL) from inception through February 2026. The strategy combined

subject headings and free-text terms across three concept groups: parotidectomy and parotid surgery; drainage and drains; and fluid-related complications and drain-management terms. Search lines #1 and #2 captured the parotidectomy/parotid surgery concept using controlled vocabulary and free-text terms, respectively, and were combined with OR to maximize sensitivity. Search lines #3 and #4 captured drainage-related concepts, while search lines #5 and #6 captured fluid-related complications and drain-management terms. The PubMed search was structured as (#1 OR #2) AND (#3 OR #4) AND (#5 OR #6), with equivalent strategies adapted for Embase and CENTRAL using each database's controlled vocabulary. No filters for study design, language, publication year, or publication status were applied at the search stage. Reference lists of included studies and recent reviews were hand-searched for additional eligible studies.

**Participant or population** Adults (≥18 years) undergoing superficial, partial superficial, or total parotidectomy for a benign or malignant parotid neoplasm. Mixed cohorts will be included where neoplastic disease is the main indication and arm-level data can be extracted. Non-neoplastic cases will be documented and taken into account during risk-of-bias assessment. Pediatric populations, revision parotidectomy, and parotidectomy with extended composite resection will be excluded from the primary analysis.

**Intervention** Postoperative drainage pathways are defined at the arm level by the combination of drain use and the rule by which the drain is removed:
1. Drainless (DL): no postoperative drain, with or without bundled fibrin sealant or pressure dressing.
2. Strict volume-based (SVB): drain removed when 24-hour output falls below 30 mL.
3. Liberal volume-based (LVB): drain removed at output thresholds above 30 mL/24 hours.
4. Time-based (TB): drain removed at a pre-specified postoperative day or interval, regardless of output.
5. Hybrid or uncertain protocols: arms with combined removal rules or insufficiently described protocols.
Each arm in each included study will be classified into one of these pathways during extraction. The final analytic grouping of pathways will depend on the available evidence and the clinical and methodological comparability of the included studies. Co-interventions such as fibrin sealant, pressure dressing, sternocleidomastoid flap, and other dead-space management measures will also be recorded because they may influence postoperative outcomes and the interpretation of pathway effects.

**Comparator** Comparison among the predefined postoperative drainage pathways, including drainless, volume-based, and time-based approaches. Where relevant, additional mixed or alternative drain-removal protocols will be considered according to the available evidence.

**Study designs to be included** Randomized controlled trials (RCTs), prospective cohort studies, or retrospective cohort studies that provide direct comparative data between at least two predefined postoperative drainage pathway nodes.

**Eligibility criteria** Inclusion criteria
1. Studies reporting at least one prespecified outcome at the study-arm level and describing the postoperative drainage protocol in sufficient detail to allow pathway classification.
2. Full-text articles published in English.
Exclusion criteria
1. Case reports, small case series, conference abstracts without full data, editorials, narrative reviews, letters, study protocols, and experimental studies.
2. Studies in which parotidectomy is not the index procedure.
3. Studies in which the drainage protocol cannot be determined from the published report and cannot be clarified by the authors.
4. Duplicate or overlapping cohorts, in which case the larger or more complete dataset will be retained.

**Information sources** The electronic information sources will include PubMed/MEDLINE, Embase, and the Cochrane Central Register of Controlled Trials (CENTRAL). In addition, the reference lists of included studies and relevant review articles will be screened manually for further eligible records.

**Main outcome(s)** Postoperative fluid-related complications, defined as the composite of seroma and sialocele in the early postoperative period, according to each study's reported definition and follow-up window. The principal effect measure will be the odds ratio with 95% confidence intervals. Salivary fistula will not be included in the primary outcome because it represents a distinct postoperative event from seroma and sialocele. It will be examined separately in sensitivity analysis.

**Additional outcome(s)** Secondary outcomes will include length of postoperative hospital stay, postoperative hematoma, and explicit clinical

surgical site infection. These outcomes will be extracted and analyzed according to the nature and reporting of the available data.

**Data management** Search results will be imported into Rayyan for de-duplication and title/abstract screening. Title and abstract screening will be performed by one reviewer. Full-text review will be conducted by two reviewers, with disagreements resolved by discussion and, where necessary, consultation with a third reviewer. Data will be extracted at the study-arm level using a piloted, standardized electronic form. Extracted items will include study design, setting, population characteristics, drainage pathway details, co-interventions, outcome definitions, event counts, denominators, and length-of-stay data where available. Original study outcome definitions will be recorded alongside the extracted data, and any decisions regarding the alignment of non-identical outcome definitions across studies will be documented explicitly at the synthesis stage.

**Quality assessment / Risk of bias analysis** Risk of bias will be assessed using ROBINS-I for non-randomized studies and the Cochrane Risk of Bias 2 tool for randomized trials. Assessment will be performed by two reviewers, with disagreements resolved by discussion and, where necessary, consultation with a third reviewer. Particular attention will be paid to baseline differences in tumor and operative characteristics between study groups, non-random allocation to drainage pathways, departures from the intended drainage strategy, and incomplete or selective reporting of clinically relevant postoperative outcomes. Studies judged to be at critical risk of bias will not be excluded automatically, but their influence on the overall findings will be explored in sensitivity analyses.

**Strategy of data synthesis** Data will be synthesized separately for each outcome. Where studies are sufficiently comparable in design, drainage pathway definition, and outcome reporting, quantitative synthesis will be undertaken using random-effects meta-analysis. Network meta-analysis will be considered only when the available evidence forms a clinically and methodologically reasonable network. The primary quantitative outcome will be postoperative fluid-related complications, defined as seroma and sialocele. Length of stay and postoperative hematoma will be analyzed quantitatively where possible. Surgical site infection will be synthesized according to the consistency and clinical comparability of the reported definitions. If the available evidence is too sparse or too heterogeneous to support formal pooling, findings will be summarized descriptively. Any treatment ranking, if presented, will be interpreted as exploratory.

**Subgroup analysis** Pre-specified subgroup analyses will be considered, subject to the availability of suitable arm-level data, for:
1. extent of parotidectomy (partial superficial, superficial, or total);
2. malignant case mix within each study arm;
3. concurrent neck dissection;
4. fibrin sealant use;
5. pressure dressing use;
6. single-center versus multicenter study design.

Any subgroup findings will be regarded as exploratory.

**Sensitivity analysis** Pre-specified sensitivity analyses will be considered according to the structure and completeness of the extracted data. These may include alternative pathway groupings, restriction to studies in which parotid neoplasms represent the main indication for surgery, restriction to studies at lower risk of bias, restriction to studies using clearer clinical outcome definitions, and a broader fluid-related outcome definition that includes salivary fistula.

**Language restriction** No language restriction was applied at the search stage. However, studies not published in English were excluded during study selection.

**Country(ies) involved** Taiwan.

**Other relevant information** Outcome definitions will be retained as reported in the original studies and handled transparently during synthesis.

**Keywords** parotidectomy; parotid neoplasm; postoperative drainage; drainless; fibrin sealant; seroma; sialocele; network meta-analysis.

**Dissemination plans** The completed review will be submitted to a peer-reviewed ENT or head and neck surgery journal. Findings may also be presented at scientific meetings.

**Contributions of each author**

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