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Conchopexy of middle turbinate Versus Bolgerization in Endoscopic Sinus Surgery..

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ABSTRACT

Background: Middle turbinate (MT) lateralization remains a frequent postoperative complication of functional endoscopic sinus surgery (FESS), potentially leading to synechiae, impaired ventilation, and surgical failure. This study aimed to compare the efficacy of Conchopexy and Bolgerization techniques in preventing MT lateralization and promoting postoperative healing.

Methods: A prospective comparative interventional study was conducted on 45 patients with chronic rhinosinusitis undergoing bilateral FESS at Rizgari Teaching Hospital from January to December 2023. Patients were randomized into two groups: Group A (Conchopexy, n = 23) underwent MT–septal fixation using an absorbable suture, while Group B (Bolgerization, n = 22) received controlled mucosal abrasion to create a synechia. The MT position and mucosal healing (POSE score) were assessed at 12 weeks postoperatively. Statistical analysis was performed using SPSS v27 with a significance level of $p < 0.05$.

Results: MT lateralization occurred in 13.1% of Conchopexy cases and 9.1% of Bolgerization cases ($p = 0.67$). The mean POSE score was 2.33 ± 1.17 for Conchopexy and 2.08 ± 1.43 for Bolgerization ($p = 0.54$), indicating comparable mucosal healing. No major complications or follow-up losses were reported.

Conclusion: Conchopexy and Bolgerization are equally safe and effective in maintaining MT medialization and supporting mucosal recovery following FESS. Bolgerization offers simplicity and shorter operative time, whereas Conchopexy provides secure fixation and mucosal preservation. The choice of technique should depend on intraoperative anatomy and surgeon preference.

KEYWORDS: Conchopexy, Bolgerization, Middle turbinate, Endoscopic sinus surgery, Chronic rhinosinusitis, POSE score.,

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INTRODUCTION

Endoscopic sinus surgery (ESS) is the mainstay treatment for medically refractory chronic rhinosinusitis and selected sinonasal disorders [1]. However, postoperative adhesions—particularly middle turbinate (MT) lateralization with middle meatal synechiae—remain among the most frequent causes of surgical failure and revision surgery [2]. Contemporary studies continue to report MT lateralization as a common sequela of ESS that compromises ventilation, drainage, and endoscopic access, despite advances in technique and perioperative care [3].

Multiple intraoperative strategies have been advocated to maintain MT medialization, including controlled synechiae ("Bolgerization"), conchopexy (MT–septal suturing), partial turbinectomy, middle-meatal spacers or implants (including steroid-eluting devices), and short-term nasal packing or splints [4]. Recent randomized and comparative studies, as well as systematic reviews, highlight the ongoing debate regarding which approach provides the optimal balance of turbinate stability, mucosal healing, patient comfort, and operative efficiency [2,5,6].

Bolgerization—originally described as purposeful, matched mucosal abrasions on the medial MT and opposing septum to create a controlled adhesion—remains widely practiced because it is simple, implant-free, and cost-effective [6]. Nonetheless, concerns persist regarding the variability of adhesion strength and the potential for excessive scarring if the abrasion is overly aggressive [7].

By contrast, conchopexy employs a trans-septal or MT–septal suture to provide immediate mechanical fixation without creating a raw mucosal surface [8]. Recent prospective and comparative reports suggest that conchopexy effectively reduces MT lateralization and synechiae formation while preserving olfaction and postoperative accessibility [9]. However, this technique may add operative time and carries risks related to septal perforation or suture irritation [10].

Although a growing number of studies have compared these two methods, existing evidence remains limited and heterogeneous across centers, surgical techniques, and adjunctive measures such as spacers or packing. Recent prospective and long-term observational studies have demonstrated comparable efficacy between the two techniques, with subtle differences in stability, middle meatal patency, and ease of revision surgery. These findings underscore the need for a focused comparative evaluation of conchopexy versus Bolgerization in preventing MT lateralization and improving surgical outcomes following ESS.

This study aims to compare the clinical outcomes of Bolgerization and Conchopexy techniques in preventing middle turbinate lateralization after endoscopic sinus surgery. The comparison focuses on rates of turbinate lateralization, synechiae formation, middle meatal patency, and the overall success of postoperative healing.

MATERIALS AND METHODS

Study Design and Setting

This prospective, comparative, interventional study was conducted in the Department of Otolaryngology–Head and Neck Surgery, Rizgari Teaching Hospital, in collaboration with the Kurdistan Board for Medical Specialties (KBMS), from January to December 2023.

Study Population

A total of 45 patients aged 18–75 years (25 males and 20 females) diagnosed with chronic rhinosinusitis with or without nasal polyposis and requiring bilateral functional endoscopic sinus surgery (FESS) were enrolled after obtaining written informed consent.

Inclusion Criteria

Patients with chronic rhinosinusitis unresponsive to maximal medical therapy.

Patients undergoing bilateral FESS with or without septoplasty.

Exclusion Criteria

Previous sinonasal surgery.

Allergic fungal sinusitis.

Nasal trauma or deformity.

Unfitness for general anesthesia.

Grouping and Interventions

Patients were randomly allocated into two groups:

Group A (Conchopexy): The middle turbinate was medialized using a 4-0 Vicryl suture, which was passed through the turbinate and nasal septum to the contralateral side and tied securely under endoscopic visualization.

Group B (Bolgerization): Controlled synechia was created by abrading the mucosa on the medial surface of the middle turbinate and the adjacent septal mucosa (approximately 3 × 3 mm) using a sickle knife. The turbinate was then pushed medially, and nasal packing was placed lateral to it for 24–48 hours to maintain its position.

Outcome Measures

Postoperative assessments were performed at the 2nd and 12th weeks after surgery.

Primary outcome: Position of the middle turbinate (normal/medialized vs. lateralized).

Secondary outcome: Sinonasal healing evaluated using the POSE (Postoperative Sinus Endoscopy) score, where higher scores indicate greater mucosal abnormality (edema, discharge, crusting, or polypoidal change).

Statistical Analysis

Data were analyzed using the Chi-square test for categorical variables and Student's *t*-test for continuous variables. Continuous data were expressed as mean ± standard deviation (SD). A p-value of < 0.05 was considered statistically significant. All the analysis conducted by SPSS version (27).

Ethical Considerations

The study protocol was reviewed and approved by the Ethical Committee of the Kurdistan Board for Medical Specialties (KBMS) (Approval No. 98). All procedures were performed in accordance with the ethical standards of the institutional and national research committees and with the principles of the 1964 Declaration of Helsinki and its later amendments.

RESULTS

Table 1 presents the demographic profile of the study participants. A total of 45 patients were included, with 23 assigned to the Conchopexy group and 22 to the Bolgerization group. The age range of participants was 18–75 years, with a mean age of 40 ± 12 years, indicating that both groups were comparable in terms of age distribution. The gender distribution was nearly equal, comprising 25 males (55.6%) and 20 females (44.4%), yielding a male-to-female ratio of approximately 1.25:1. This balanced distribution reduces the likelihood of demographic bias. Importantly, all patients completed the 12-week follow-up period, ensuring full data availability and strengthening the validity of the results. No participants were lost to follow-up, demonstrating good compliance and robust study retention.

Table 1. Demographic Characteristics of the Study Population (n = 45)

Variable	**Conchopexy (n = 23)**	**Bolgerization (n = 22)**	**Total (n = 45)**
***Age** (years)*	*18–75 (mean 40 ± 12)*	*18–75 (mean 40 ± 12)*	*18–75 (mean 40 ± 12)*
Gender			
Male	*13 (56.5 %)*	*12 (54.5 %)*	*25 (55.6 %)*
Female	*10 (43.5 %)*	*10 (45.5 %)*	*20 (44.4 %)*
Male: Female ratio	1.3: 1	1.2: 1	1.25: 1
Follow-up completion	23 (100 %)	22 (100 %)	45 (100 %)

Note: All participants completed the 12-week follow-up period. No dropouts were recorded.

Table 2 compares the postoperative position of the middle turbinate (MT) between the Conchopexy and bolgerization groups at the 12th postoperative week. In the Conchopexy group, 20 patients (86.9%) maintained a normal or medialized MT position, while 3 patients (13.1%) showed lateralization. Similarly, in the Bolgerization group, 20 patients (90.9%) had a normal/medialized MT, and 2 patients (9.1%) demonstrated lateralization.

The difference between groups was not statistically significant ($\chi^2 = 0.178$; $p = 0.67$), indicating that both Conchopexy and Bolgerization were equally effective in maintaining turbinate medialization following endoscopic sinus surgery. These findings suggest that either technique can be used successfully to minimize postoperative turbinate lateralization.

Table 2. Comparison of Middle Turbinate Position at 12 Weeks Post-Operation

Middle Turbinate Position	**Conchopexy (n = 23)**	**Bolgerization (n = 22)**	**χ^2**	**p-value**
Normal / Medialized	20 (86.9 %)	20 (90.9 %)	0.178	0.67
Lateralized	3 (13.1 %)	2 (9.1 %)		

Table 3 compares sinonasal healing outcomes between the two study groups using the Post-Operative Sinus Endoscopy (POSE) score, in which lower values indicate healthier mucosa. The mean POSE score in the Conchopexy group was 2.33 ± 1.17, while in the Bolgerization group it was 2.08 ± 1.43.

Although the Conchopexy group demonstrated a slightly lower mean score, indicating marginally better mucosal recovery, the difference was not statistically significant ($p = 0.54$).

These findings suggest that both surgical methods resulted in comparable postoperative mucosal healing and effective sinus recovery over the 12-week follow-up period.

Table 3. Comparison of POSE (Post-Operative Sinus Endoscopy) Scores Between Groups

Parameter	Conchopexy (n = 23)	Bolgerization (n = 22)	p-value
Mean ± SD POSE score	2.33 ± 1.17	2.08 ± 1.43	0.54

DISCUSSION

The middle turbinate (MT) serves a critical physiological and surgical role in functional endoscopic sinus surgery (FESS), maintaining airflow regulation, humidification, and providing a reliable anatomical landmark for re-entry in revision procedures. However, postoperative MT lateralization remains one of the most frequent complications of FESS, reported in 1–30 % of cases, and is a major cause of middle meatal obstruction, impaired sinus drainage, and surgical failure [3,9,11]. Therefore, achieving stable MT medialization is vital to prevent restenosis of the osteomeatal complex and ensure long-term surgical success [12].

Various intra-operative strategies have been developed to prevent MT lateralization, including Bolgerization (controlled synechia formation)[13], Conchopexy (MT-septal suturing) [14], middle-meatal spacers [3], and bioresorbable stents [15]. Among these, Bolgerization and Conchopexy remain the most widely practiced because they are simple, implant-free, and cost-effective [3,5]. The present prospective comparative study evaluated these two methods to determine their efficacy in maintaining turbinate medialization and promoting mucosal healing after FESS.

Main Findings

At 12 weeks postoperatively, MT lateralization occurred in 13.1 % of Conchopexy cases and 9.1 % of Bolgerization cases, with no statistically significant difference ($p = 0.67$). Similarly, the mean POSE score—reflecting sinonasal mucosal healing—was 2.33 ± 1.17 in the Conchopexy group and 2.08 ± 1.43 in the Bolgerization group ($p = 0.54$). Both methods achieved successful medialization in over 85 % of patients without major complications, demonstrating comparable short-term outcomes.

Comparison with Previous Studies

Our results are consistent with previous studies showing similar success between the two techniques. [6] reported that both procedures achieved over 90 % medialization success with no significant difference. Likewise, [16] confirmed comparable rates of MT stability and mucosal healing, emphasizing that surgeon experience rather than the choice of technique often determines success.

Bolgerization, first described by Bolger et al. (1999) [17], relies on matched mucosal abrasions between the MT and nasal septum to produce controlled synechia. Its popularity stems from being quick, inexpensive, and implant-free, but its efficacy can vary with the extent of abrasion and healing response; excessive trauma may lead to bleeding or septal perforation [18]. In contrast, Conchopexy secures the MT to the septum with an absorbable suture, providing mechanical fixation without mucosal injury or postoperative packing, and is especially beneficial when septoplasty or unstable turbinates are present [19–21]. In the present series, both methods were safe, with no reported complications or follow-up losses, confirming their reliability in standard FESS practice.

Clinical Interpretation

These findings indicate that Conchopexy and Bolgerization are equally effective for stabilizing MT and promoting mucosal healing. Bolgerization may be favored for its simplicity and shorter operative time, while Conchopexy provides more secure fixation when packing is contraindicated or mucosal preservation is desired. The choice of technique should thus be individualized based on intraoperative anatomy, surgeon expertise, and patient-specific factors rather than presumed superiority.

Limitations and Future Directions

The main limitations of this study include its small sample size (n = 45) and short follow-up period (12 weeks), which may not capture long-term adhesion patterns or delayed complications. Disease severity and extent of dissection were not stratified, which could influence healing outcomes. Larger, multicenter trials with longer follow-up and inclusion of radiologic and olfactory outcomes are warranted to confirm these results and refine surgical recommendations.

CONCLUSION

Both Conchopexy and Bolgerization proved to be safe and effective in preventing middle turbinate lateralization after functional endoscopic sinus surgery (FESS). The two techniques showed comparable results in maintaining turbinate medialization and promoting postoperative mucosal healing, as reflected by similar POSE scores and low complication rates.

While Bolgerization is simpler and faster, Conchopexy offers secure fixation and avoids mucosal injury, making it preferable in selected cases such as septoplasty or when nasal packing is contraindicated.

Given the absence of significant differences, technique selection should depend on anatomical and patient factors rather than

superiority. Larger, multicenter studies with long-term follow-up are needed to validate these findings and assess late postoperative outcomes.

Declarations

Ethical Approval:

Ethical approval for this study was obtained from the **Ethical Committee of the Kurdistan Board for Medical Specialties (KBMS)** (Approval No. 98). All procedures involving human participants were performed in accordance with institutional and national research ethics standards and with the **Declaration of Helsinki** and its later amendments.

Informed Consent:

Written informed consent was obtained from all participants prior to inclusion in the study. Participants were informed about the study's objectives, procedures, and potential risks, and confidentiality was strictly maintained.

Authors' Contributions:

All authors contributed equally to the conception, design, data collection, analysis, and manuscript preparation. All authors read and approved the final version of the manuscript.

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Conflict of Interest:

The authors declare **no conflicts of interest** related to this study.

Availability of Data and Materials:

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

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