COMPARATIVE EFFICACY OF BRONCHOSCOPE-GUIDED INTUBATION AND CONVENTIONAL LARYNGOSCOPIC INTUBATION IN PATIENTS WITH TRACHEAL DEFORMITY

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Relevance. *Tracheal deformity (compression, axial displacement, and narrowing) caused by goiter, mediastinal tumors, and cicatricial tracheal stenosis is one of the most challenging and hazardous situations for airway management. In such patients, intubation by direct laryngoscopy fails on the first attempt in 50–60% of cases, with an increased risk of hypoxia, mucosal injury, and a "cannot intubate–cannot ventilate" situation. The efficacy of bronchoscope-guided intubation compared with conventional techniques in this patient group has not been sufficiently studied.*

Objective. To comparatively evaluate the safety and efficacy of bronchoscope-guided intubation versus conventional laryngoscopic intubation in patients with tracheal deformity.

Materials and Methods. Data from 100 patients who underwent surgery for tracheal deformity at the Republican Specialized Scientific and Practical Medical Center of Surgery named after Academician V. Vakhidov and the clinic of Tashkent Medical Academy between 2016 and 2025 were analyzed (66% women; mean age 52.4±15.8 years). The causes of deformity were retrosternal/giant goiter in 77 patients, mediastinal tumors and cysts in 9, thymoma in 5, post-intubation cicatricial stenosis in 4, and other causes in 5 patients. According to CT data, the mean degree of tracheal lumen narrowing was 49.7±13.9%, the minimum lumen diameter was 8.1±2.5 mm, and axial displacement was 9.0±5.8 mm. According to the intubation technique, patients were divided into two groups: Group I (n=62) – bronchoscope-guided intubation (Ia, n=41 – under local anesthesia and sedation with spontaneous breathing maintained; Ib, n=21 – after induction); Group II (n=38) – conventional technique (IIa, n=22 – direct laryngoscopy; IIb, n=16 – videolaryngoscopy). The groups did not differ in age, sex, BMI, ASA class, or degree of stenosis ($p>0.05$). Statistical analysis included the χ^2 test, Fisher's exact test, Mann–Whitney test, odds ratios (OR), and logistic regression.

Results. Successful intubation on the first attempt was achieved in 56 (90.3%) patients in Group I and 18 (47.4%) patients in Group II (OR 9.63; 95% CI 3.45–26.89; p<0.001); the mean number of attempts was 1.1±0.4 and 1.8±0.9, respectively (p<0.001). During intubation, the minimum SpO_2 was 94.8±3.0% in Group I versus 90.6±5.6% in Group II (p<0.001); episodes of hypoxia (SpO_2<90%) occurred in 4.8% and 28.9%, respectively (p=0.002), while mucosal injury and bleeding occurred in 4.8% and 28.9% (p=0.002), and postoperative mucosal edema in 9.7% and 28.9% (p=0.027). The overall complication rate was three times lower in Group I: 21.0% versus 65.8% (OR 0.14; 95% CI 0.06–0.35; p<0.001). Esophageal intubation and severe hypoxia (SpO_2<85%) occurred only in Group II (two cases each). Patients in Group I had a shorter ICU stay: 16.7±9.0 hours versus 25.9±11.3 hours (p<0.001). In subgroup Ia, intubation performed while maintaining spontaneous breathing provided the highest SpO_2 values (95.6±2.8% versus 93.3±2.7% in subgroup Ib; p=0.003); sedation with dexmedetomidine was best tolerated by patients (discomfort score 1.9±1.6 on the VAS), and 92.7% of patients stated that they would agree to undergo the same technique again if necessary. Multivariable analysis confirmed that bronchoscopic intubation was an independent protective factor against first-attempt intubation failure (aOR 0.06; 95% CI 0.02–0.20; p<0.001), whereas ≥50% tracheal narrowing was a risk factor (aOR 4.14; 95% CI 1.26–13.68; p=0.020).

Conclusion. In patients with tracheal deformity, bronchoscope-guided intubation increases first-attempt success by 1.9-fold compared with conventional laryngoscopic intubation, reduces the incidence of hypoxia and mucosal injury sixfold and overall complications threefold, and shortens ICU stay. When tracheal lumen narrowing is ≥50%, bronchoscope-guided intubation with preservation of spontaneous breathing should be considered the first-choice technique.