

ABSTRACT

Objective: Epiglottopexy has been an increasingly utilized intervention in children with epiglottic prolapse and airway obstruction. Given the role of the epiglottis in protecting the airway during swallowing and the potential effect of repositioning the epiglottis on the passage of the bolus, we aimed to compare swallowing outcomes before and after epiglottopexy in children.

Design: A retrospective cohort study

Setting: Tertiary care children's hospital

Methods: Data were extracted from charts of children who underwent epiglottopexy and had a subsequent instrumental swallowing evaluation between 1/2018 to 9/2022.

Results: A total of 93 patients underwent epiglottopexy. Of these, 38 patients met inclusion requirements. The mean age at surgery was 41 ± 47 months. Most patients (n=37, 97.4%) had significant comorbidities such as secondary airway lesions (n=33, 91.7%), a genetic or syndromic disorder (n=25, 69.4%), and dysphagia (n=29, 76.3%). All patients had a concurrent procedure at time of epiglottopexy with supraglottoplasty (n=24, 63.2%) and lingual tonsillectomy (n=16, 42.1%) being the most common. No changes in initiation or patterns of swallowing were noted postoperatively. A total of 7 (18.4%) patients had worsening swallow function: 2 had new-onset dysphagia, and 5 had worsening pre-existing dysphagia. Liquid or food textures penetrated remained unchanged or improved in most cases. No risk factors for worsening dysphagia were identified in our cohort.

Conclusions: Children with medical comorbidities undergoing epiglottopexy with additional airway interventions may experience new or worsening dysphagia. However, the procedure is generally safe without notable patterned changes in the swallowing mechanism.

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INTRODUCTION

Epiglottopexy, securing the epiglottis to the base of the tongue, has been an increasingly utilized intervention for children with epiglottic prolapse resulting in airway obstruction. Previous studies demonstrated the added value of epiglottopexy in relieving airway obstruction. Surgical interventions in the supraglottic region have previously been shown to be associated with worsening or new-onset dysphagia.¹⁻³ Therefore, it is reasonable to suspect that swallowing function may be impacted by epiglottopexy.^{4,5}

Instrumental assessment of swallowing function is often conducted by a speech-language pathologist (SLP) with videofluoroscopic swallow study (VFSS) and fiberoptic endoscopic evaluation of swallow (FEES). Swallowing assessment with VFSS/FEES allows SLPs to objectively measure the severity of dysphagia according to the well-validated and reliable Dysphagia Outcome and Severity Scale (DOSS),⁶ which guides feeding recommendations. Given the role of the epiglottis in protecting the airway during swallowing and the complexity of the swallowing mechanism, we aimed to compare swallowing outcomes before and after epiglottopexy in children and identify variables associated with postoperative worsening of swallow function. The knowledge gained from our study may be used to better counsel patients and their parents on the risks and benefits of this intervention.

METHODS AND MATERIALS

Data was collected from the electronic medical records of all patients less than 18 years old who underwent epiglottopexy between 2018 to 2022 and had a post-operative VFSS or FEES. Worsening swallow function was defined as a worsening DOSS score. When calculating the mean change in highest International Dysphagia Diet Standardization Initiative (IDDSI)⁷ level penetrated or aspirated, a negative value represented an improvement (or a reduction in the highest IDDSI level penetrated). When comparing patients with or without worsening swallow function, patients without worsening swallow function were excluded if their post-operative swallow studies occurred more than 6 months after epiglottopexy, due to the expected improvement in swallowing function associated with increasing age. Baseline characteristics were summarized as means and standard deviations (SD) or proportions. Unadjusted comparisons and group differences were assessed using a t-test. Categorical variables were tested with Chi-square or Fisher's exact tests as appropriate.

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RESULTS

Pre- and Post-Operative Swallowing Function
32 and 38 patients underwent instrumental swallowing evaluation pre- and post-operatively, respectively. The mean DOSS score was 3.5±1.9 pre-operatively, representing Mild-moderate to Moderate dysphagia, and 4.0±2.1 post-operatively, also representing Mild-moderate dysphagia. The highest IDDSI level penetrated remained unchanged or improved in most cases (n=12, 70.6%). The location of penetration during FEES did not demonstrate any patterns.

Patients with Worsening Swallow Function

7 (18.4%) patients demonstrated worsening of swallow function and 31 (81.6%) patients had unchanged or improved swallowing function. There were no significant differences between patients with and without worsening swallow function. Of those patients with worsening swallow function, 2 (5.3%) demonstrated new-onset dysphagia and 5 (13.1%) had worsening of pre-existing dysphagia. The 2 patients with new-onset dysphagia had post-operative DOSS scores of 3 (Moderate dysphagia) and 5 (Mild dysphagia) respectively. The 5 patients with worsening dysphagia had an increase of DOSS score from 3.6±0.9 (Mild-moderate to Moderate dysphagia) to 2±1.0 (Moderately-severe dysphagia). Of the 7 patients with post-operative worsening swallow function, worsening persisted in the majority of patients with 5/6 (83.3%) still having worsened swallow at 1-year post-surgery and 4/6 (33.3%) at 2-years post-surgery.

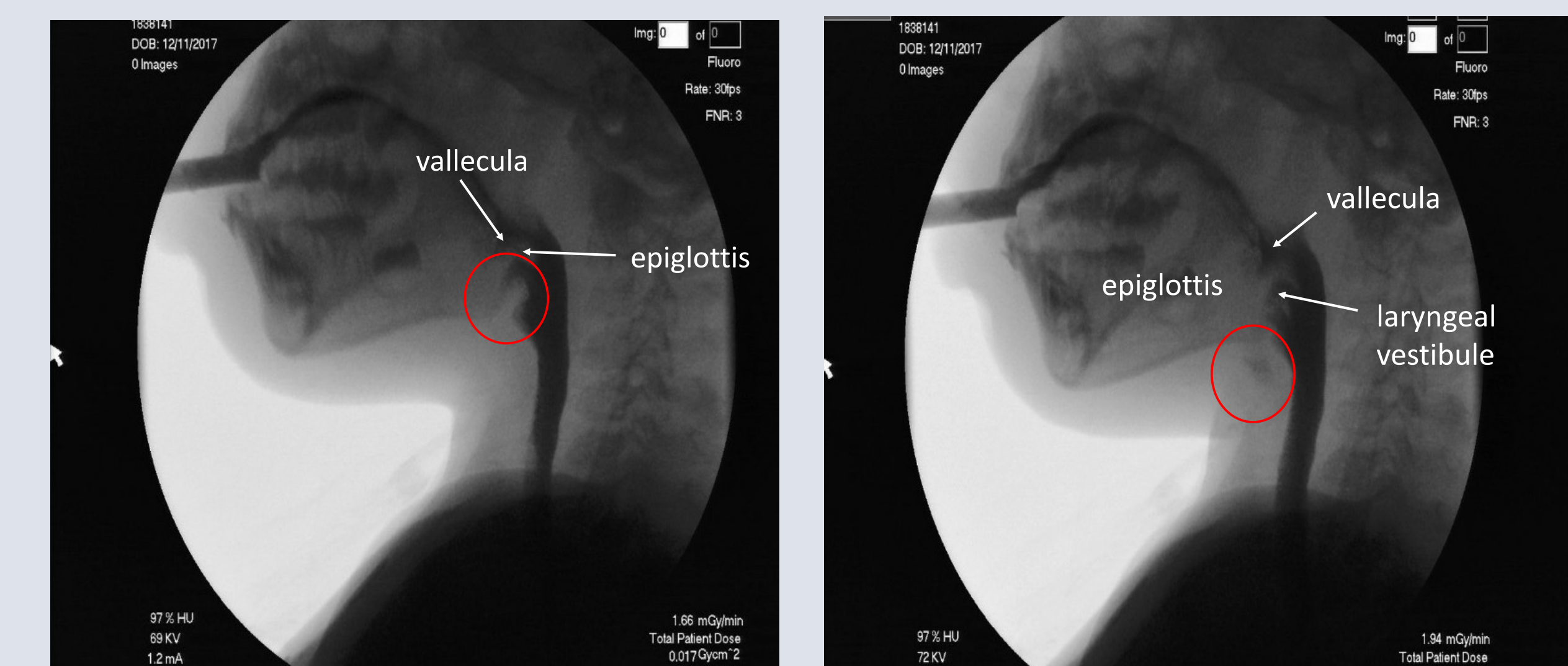
Table 1. Instrumental Swallow Study Performed

| Instrumental Swallow Evaluation | | | |
|---------------------------------|-----------|----------------|-----------|
| Pre-Op, n (%) | 32 (100) | Post-Op, n (%) | 38 (100) |
| VFSS | 23 (60.5) | VFSS | 27 (71.1) |
| FEES | 2 (5.3) | FEES | 4 (10.5) |
| VFSS + FEES | 7 (21.9) | VFSS + FEES | 7 (18.4) |

Table 2. Swallowing Function Before and After Epiglottopexy

| Characteristic | | | |
|--------------------|----------------|---------------|-----------|
| Dysphagia, n (%) | | | 38 (100) |
| | Before surgery | After surgery | |
| Dysphagia, n (%) | Present | Present | 23 (60.5) |
| | Absent | Absent | 6 (15.8) |
| | Absent | Present | 2 (5.3) |
| | Present | Absent | 7 (18.4) |
| Penetration, n (%) | | | 32 (100) |
| | Before surgery | After surgery | |
| | Present | Present | 17 (53.1) |
| | Absent | Absent | 6 (18.8) |
| Aspiration, n (%) | | | 32 (100) |
| | Before surgery | After surgery | |
| | Present | Present | 10 (31.3) |
| | Absent | Absent | 14 (43.8) |
| Aspiration, n (%) | | | 32 (100) |
| | Before surgery | After surgery | |
| | Present | Present | 10 (31.3) |
| | Absent | Absent | 14 (43.8) |
| Aspiration, n (%) | | | 32 (100) |
| | Before surgery | After surgery | |
| | Present | Present | 10 (31.3) |
| | Absent | Absent | 14 (43.8) |

Figure 1. VFSS findings



A 3-year-old s/p epiglottopexy: Incomplete glottic closure resulting in laryngeal penetration (A) and aspiration (B)

DISCUSSION

Our study showed that epiglottopexy in children with multiple comorbidities, while generally safe, can be associated with worsening swallow function both in patients with or without pre-existing dysphagia. Overall, initiation of swallow, bolus passage, and location of penetration were unchanged. In patients with preoperative dysphagia, there was a slight increase in the consistency aspirated postoperatively. Comparing pre- and post-operative swallowing outcomes, 3 (7.9%) cases had new onset penetration or aspiration, and 7 (18.4%) cases required higher level of texture modification. There was no difference in preoperative variables, or degree of dysphagia between patients with and without worsening or new onset dysphagia postoperatively.

In the physiologic swallow, airway protection is established during the pharyngeal phase of swallowing through laryngeal vestibule closure. Epiglottopexy may alter the swallowing mechanism through changing sensory feedback and timing of swallow reflex initiation, restricting epiglottic inversion, or changing the pattern of bolus passage over the epiglottis. The reduction in the vallecular volume may interrupt the flow of the bolus to the pyriform sinuses and disrupt the initiation of swallowing. Altering the swallowing mechanism could potentially increase the risk of aspiration in children with immature or disorganized swallowing mechanisms, particularly in children with hypotonia or comorbidities compromising their ability to compensate.

CONCLUSIONS

Epiglottopexy may be a beneficial intervention for children in which epiglottic prolapse is a contributing cause to refractory airway obstruction. Children with medical comorbidities undergoing epiglottopexy with additional airway interventions may experience new or worsening dysphagia. However, the procedure is generally safe without notable patterned changes in the swallowing mechanism.