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Sequelae of recurrent laryngeal nerve injury after patent ductus arteriosus ligation

Kevin D. Pereira [a,*], Benjamin D. Webb [a], Martin L. Blakely [b], Charles S. Cox Jr. [c], Kevin P. Lally [c]

[a] *Department of Otolaryngology-Head and Neck Surgery, The University of Texas Health Science Center at Houston, United States*
[b] *Department of Surgery, Division of Pediatric Surgery, The University of Tennessee at Memphis, United States*
[c] *Department of Surgery, Division of Pediatric Surgery, The University of Texas Health Science Center at Houston, United States*

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Summary

Objectives: To prospectively study the clinical course of neonates with vocal cord paralysis (VCP) after patent ductus arteriosus (PDA) ligation.
Methods: A prospective cohort study of all premature infants undergoing PDA ligation from March 2001 to February 2004. Flexible laryngoscopy was performed after extubation to assess vocal cord function. Data regarding patient characteristics, operative findings, post-operative endoscopic findings, and the subsequent clinical course were collected.
Results: One hundred patients were enrolled. Flexible laryngoscopy was performed on 61 patients. Median birth weight was 740 g, gestational age 25 weeks, and age at operation 23 days. Flexible laryngoscopy was performed at an average of 8 days after extubation. Seven cases of vocal cord paralysis were identified. Two had stridor and feeding difficulty requiring nasogastric feeding. Five of the seven had an average follow-up of 9 months after surgery. At last follow-up, endoscopically satisfactory compensation by the normal vocal cord was observed in all five patients. No patient had feeding problems.

* Corresponding author at: UT-Department of Otolaryngology-HNS, 6410 Fannin # 1200, Houston, TX 77030, United States. Tel.: +1 713 500 5410; fax: +1 713 500 0661.
E-mail address: Kevin.D.Pereira@uth.tmc.edu (K.D. Pereira).

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Conclusions: The majority of infants who can be successfully extubated after PDA ligation tend to be asymptomatic despite vocal cord paralysis. Compensation appears to occur rapidly, and patients generally have no *long-term problems with the airway or feeding.

1. Introduction

Advances in neonatal intensive care now permit the survival of increasing numbers of premature infants. Depending on their gestational age, between 15 and 80% will have a patent ductus arteriosus (PDA) [4]. Iatrogenic trauma to the recurrent laryngeal nerve during surgical closure of a PDA with resultant vocal cord paralysis (VCP) is a well documented complication which has previously been studied and reported in literature [7,6,5]. However, the true incidence of this complication has never been determined. All published reports to date have been retrospective, and only symptomatic patients have been evaluated [7,5,2]. The identification of this complication was contingent on the development of symptoms in the post-operative period such as stridor, weak cry, or aspiration. This study was undertaken to prospectively determine the true incidence of VCP after PDA ligation in premature infants and assess its impact on deglutition and phonation. To the best of our knowledge, this is the first prospective study of this complication and its consequences in the literature.

2. Materials and methods

All premature infants undergoing PDA ligation from March 2001 to February 2004 at the Memorial Hermann Children's Hospital were eligible for enrollment. Flexible laryngoscopy was performed on all patients after extubation to assess vocal cord function. Data regarding patient characteristics, operative findings, post-operative endoscopic findings, and the subsequent clinical course were collected. End points included return of function, right true vocal cord compensation, need for tracheostomy, vocal ability, and difficulty with feeding. All exams were performed by one examiner. The study was approved by the Committee for the Protection of Human Subjects at the University of Texas Health Science Center at Houston and the Memorial Hermann Children's Hospital (CPHS #: HSC-MS-01-033).

3. Results

One hundred patients were identified. Informed consent was obtained in all patients. Fifteen patients died prior to extubation, and 16 were awaiting extubation at the conclusion of the study. Four underwent tracheostomy for failed extubation, did not undergo an awake flexible laryngoscopy prior to the procedure and hence were excluded from the study. The remainder four patients did not undergo laryngoscopy, either due to transfer to another facility prior to endoscopy, or the caregiver's withdrawal of consent for the procedure. Flexible laryngoscopy was performed on 61 of these patients. The median birth weight was 740 g, gestational age 25 weeks, and age at operation 23 days. Median weight at operation was 914 g. Flexible laryngoscopy was performed at an average of 8 days after extubation. Seven cases of left vocal cord paralysis were identified (11.5%). The complication did not appear to be influenced by surgical technique or surgeon.

Patients with vocal cord paralysis had a longer duration of mechanical ventilation post-PDA ligation (49 versus 27 days, $P = .05$). Other preoperative and outcome measures were similar between those with and without vocal cord paralysis. Two patients with vocal cord paralysis were symptomatic, both had stridor and feeding difficulty and both required feeding tubes for 4 weeks and 3 months, respectively. Five of the seven had an average follow-up of 9 months after surgery (range 6—13 months). At last follow-up, satisfactory compensation by the normal vocal cord was observed by flexible laryngoscopy in all five patients. Although the cry was weak in all, none had any feeding difficulty. This group included the two infants who required feeding tubes.

4. Discussion

The ductus arteriosus, which is indispensable in maintaining fetal circulation, can cause significant morbidity, and even mortality, if it fails to close in the first few days after birth. Surgical closure of a PDA is a safe procedure in neonates with a low mortality rate. Left-sided vocal cord paralysis is a well-recognized complication of this procedure, and surgical techniques are continuously being refined to avoid it. With increasing numbers of very premature infants with low birth weights, there now exists a larger population of surgical candidates for closure of a PDA. Increased surveillance with the