ASSOCIATION BETWEEN CONGENITAL NASOLACRIMAL DUCT OBSTRUCTION AND MODE OF DELIVERY AT BIRTH

To the Editor: I read with interest the recent report by Tavakoli and colleagues[1] that concludes that cesarean section is an independent risk factor for the development of congenital nasolacrimal duct obstruction. Although statistical manipulations can produce *P* value significance and twinkling eyelids, the study's significant biases cannot support the authors' conclusions.

The authors report on 104 children with congenital nasolacrimal duct obstruction (CNLDO) from a population in which 48% of pregnancies are delivered by cesarean section. In such a setting, the finding that 61% of 104 CNLDO patients had a C-section (compared with 39% vaginal deliveries) may be due to chance alone, given the small number of patients. Moreover, the study suffers from ascertainment bias (tertiary referral center–observed patients) and the exclusion of those without a birth history (more likely to favor those having a vaginal delivery). The low spontaneous resolution rate (52%) and high percentage of bilateral disease (47.5%) in these cases illustrate the significant biases of this cohort.

As the authors point out, other studies have reported conflicting findings regarding the association between cesarean section and CNLDO, with some investigators[2] finding an association and others not.[3-5] However, these studies are also relatively small in size, ranging from 40[3] to 386[5] cases for those that found no association and 107 infants in the sole prior study that reported an association.[2] In a recently published report of 1,998 children diagnosed with CNLDO by primary care providers in a medically isolated region, 404 (20.2%) were delivered via C-section compared with 19.2% for the general population ($P = 0.26$).[6] Although this population-based study of 1998 afflicted children indicates that cesarean birth is not associated with the development of CNLDO, we may have to wait for big data to provide the final answer. From the cohort assembled by Tavakoli and colleagues, few if any risk factors can be named, certainly not cesarean birth, as an independent risk factor for congenital nasolacrimal duct obstruction.

Brian G. Mohney, MD
Department of Ophthalmology
Mayo Clinic
Rochester, Minnesota

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REPLY

We thank Dr. Mohney for his interest in our publication and scholarly commentary. The following provides our response to his concerns. Given the differences between the demographics of our patients and those in other geographic locations, it is possible for something to be a risk factor for a condition in our population and not in another. For instance, there may be no association between cesarean section (CS) and congenital nasolacrimal duct obstruction (CNLDO) when the population rate of CS is 19.2% (in Olmsted County) and, at the same time, there may be an association between CS and CNLDO when the population rate of CS is 48% (Miami-Dade County). Similarly, there may be differences in race and ethnicity. In their recent study of residents of Olmsted County, Dr. Mohney's group concluded that the "Caucasian" race is associated with development of CNLDO.[1] The population census data in 2010 for this area was 86% white, compared to 2018 US census data of 60.7% white (not including Latino).[2,3] Thus, if the same study was performed in a different population, a different result might be possible.

In our paper we discussed the theory that the pressure produced during vaginal delivery can potentially affect the opening of Hasner's membrane. We excluded patients without any known birth history; however, we suspect that this did not contribute largely to bias, because only 6 of 126 patients (4%) did not have a documented birth history. Also, in our study, we excluded babies who had an emergent CS delivery following a failed normal vaginal delivery

if this was documented (16 cases). These babies might have experienced the delivery pressure to some extent prior to delivery by CS. It is possible that the association between CS delivery and CNLDO is primarily among babies who had an elective (rather than emergent) CS delivery and thus captured by our data set.

Conducting research in a tertiary center does have the potential to bias the results, because we tend to treat patients with more complicated courses. However, it is still possible that a reason that our CNLDO sample had a higher rate of CS babies (63% rather than 48% in our general population) could be that CS actually is a risk factor for CNLDO. The fact that we see a larger percent of CS babies at a tertiary center may imply that these patients do in fact have a more complicated course necessitating more complex treatments.

This was a retrospective study, and the results of any retrospective research should be interpreted as potentially biased, as highlighted above. While big data might supply the answer, the big data must be relevant to the population of interest.

Mehdi Tavakoli, MD
Elizabeth A. Vanner, PhD
Kara M. Cavuoto, MD
Sara T. Wester, MD
Bascom Palmer Eye Institute
University of Miami Miller School of Medicine
Miami, Florida

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