Newborn Craniofacial Malformations

Orofacial Clefting and Craniosynostosis

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KEYWORDS

• Orofacial clefting • Craniosynostosis • Craniofacial malformations
• Genetic syndromes • Multidisciplinary clinics

KEY POINTS

- Craniofacial malformations are among the most common serious birth defects.
- Although most cases of orofacial clefting and craniosynostosis are isolated and sporadic, these abnormalities are associated with a wide range of genetic syndromes, and making the appropriate diagnosis can guide management and counseling.
- Absence of the premaxilla in patients with orofacial clefting may indicate an underlying brain malformation.
- Posterior positional plagiocephaly must be differentiated from craniosynostosis, as plagiocephaly responds to conservative management, and craniosynostosis requires surgical intervention.
- Patients with craniofacial malformation are best cared for in a multidisciplinary clinic that can coordinate the care delivered by a diverse team of providers.

INTRODUCTION

Craniofacial malformations, including orofacial clefting (OFC) and craniosynostosis (CS), are among the most common of birth defects. Most craniofacial malformations are sporadic, occurring with no family history, but they still may represent a genetically determined disorder. This determination is only one reason to make a correct genetic diagnosis (**Box 1**). Correct diagnosis can also aid in guiding management, assessing prognosis, and providing families with accurate genetic counseling and adequate access to appropriate support groups. The morbidity associated with these

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Box 1
Reasons to make the diagnosis of a genetic syndrome

Benefits of making the diagnosis of a genetic syndrome

- Helps clarify the prognosis and anticipate complications
- Guides management, including use of or avoidance of specific therapies
- Can establish risk in other family members and future offspring
- Provides patients and their families with access to appropriate support groups
- Reduces cost by obviating need for unnecessary diagnostic tests or unhelpful therapies
- Provides families with a sense of closure

malformations is significant and includes disorders of feeding, hearing, speech, oral health, and psychosocial adjustment. Craniofacial defects present a formidable challenge to patients and their families and have a significant impact on the health care system. For example, expenditures by Medicaid[1] and private insurers[2] have been estimated to be 5 to 10 times higher for children with OFC compared with children without OFC during the first 5 years of life.

OROFACIAL CLEFTING

Epidemiology

OFC is the most common birth defect, occurring in about 1 in 600 newborns worldwide, although prevalence varies based on type of defect, gender, and ethnicity. In the United States alone, more than 7000 children are born with orofacial clefting each year according to the Centers for Disease Control.[3] The prevalence of cleft lip with or without cleft palate (CL±P) has geographic variation—from 3.4 to 22.9 per 10,000 births, with the highest prevalence among Asians and Latin Americans, the lowest among Africans, and an intermediate prevalence in European whites. Additionally, a recent survey of 13.5 million live US births found that the prevalence of CL±P among Amerindians is almost twice that of non-Hispanic whites.[4] In contrast, cleft palate only (CPO) is consistent across the world, with prevalence 1.3 to 25.3 per 10,000.[5] Studies of migrant populations in the United States[6,7] and the United Kingdom[8] suggest that the geographic variation of clefting incidence is more closely linked to genetic factors rather than environmental influences.

The ratio of boys to girls affected by CL±P is roughly 2:1, whereas with CPO, the there is a female predominance. Unilateral CL±P is the most common type of OFC and accounts for about one-third of cases. Isolated cleft lip and isolated CPO account for approximately 20% to 25% each, with the remaining cases being caused by bilateral CL±P, submucous clefts, interrupted clefts, bifid uvula, or other variations. Notably, CPO is roughly twice as likely to be associated with other anomalies or to be implicated as part of a recognized genetic syndrome than defects on the CL±P spectrum.[9]

Pathogenesis

The first distinction to be made when considering orofacial clefting is between CL±P and CPO, as these have classically been considered distinct entities.[10] Cleft lip (**Fig. 1**A) arises from the failure of fusion of the median nasal prominence with the premaxillary process at 42 days of gestation, and the defect often extends to the anterior hard palate, as the primary palate is also formed during this event. Failure of appropriate fusion may later result in the inability of the lateral palatine processes to unite