Introduction

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Cleft lip and palate represent one of the great challenges of craniofacial surgery, with initial descriptions of the condition and surgical repair dating back to ancient times. Despite many diagnostic and technical aspects remaining unclarified, much progress has been achieved in understanding and treating this deformity. From more complex genetic studies clarifying its etiology to less mutilating surgical techniques, these advances have helped improve prevention and appropriate care. There is still an impressive number of patients with cleft lip or palate: it is estimated that 3.5 million children worldwide have this deformity. The burden of disease and barrier to comprehensive care is disproportionate in low- and middle-income countries. Strengthening surgical and dental treatment infrastructure is necessary to care for these patients throughout their initial development (Mars et al. 2008; Kling et al. 2014).

Treatment of cleft lip and palate is complicated by the complex etiologies of the condition. Development of the normal cephalic segment involves a complex genetic system with more than 25,000 protein codes and more than 17,000 genes contributing to the formation of the complex craniofacial skeleton. It is believed that more than 100 genes are responsible for the formation of the normal face. Presentation of cleft lip and palate is further complicated by being associated with other syndromes in more than 30% of cases, with variations seen in the types of cleft of the palate and lip. Increasing understanding of the genetic mechanisms involved in embryologic facial development, however, is encouraging for prevention efforts. Migration and

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N. Alonso, C.E. Raposo-Amaral (eds.), *Cleft Lip and Palate Treatment*,
https://doi.org/10.1007/978-3-319-63290-2_1

formation of facial processes between 4- and 12-week gestation depend on signaling genes such as sonic hedgehog, BMP, and FGFR. This knowledge can be applied to examine syndromes associated with cleft formation in the palate or lip. For example, van der Woude syndrome is often associated with missing teeth, and the main gene on chromosome 1, IRF6, plays an important role in this presentation (Craniofacial and Oral Gene Expression Network (COGENE) 2016). These ongoing findings are very promising for understanding the various mechanisms of cleft formation.

Ultimately, these data will help to guide strategies for prevention, thus avoiding large expenditures on extensive treatment of these patients. In the meantime, it is essential to continue devising protocols for safe and effective surgical treatment and care, in conjunction with speech and development of the dental arch (Losee and Kirschner 2009). In this book, we focus on all aspects of treatment in patients with this deformity throughout the entire phase of their growth and development, with the goal of facilitating full social integration of these individuals into society.

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