Advances in Craniosynostosis Research and Management

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Abstract

The purpose of the present paper is to analyze the most recent advances in the field of craniosynostosis basic and clinical research and management, and to give an overview of the more frequently adopted surgical strategies.

After reviewing some basic concepts regarding normal craniofacial embryology and growth, aetiopathogenesis of craniosynostosis and craniofacial dysostosis, classification and diagnosis and historical evolution of surgical treatment, the authors elaborate on a selection of topics that have modified our current understanding of and therapeutical approach to these disease processes. Areas covered include advances in molecular biology and genetics, imaging techniques and surgical planning, resorbable fixation technology, bone substitutes and tissue engineering, distraction osteogenesis and the spring-mediated cranioplasties, resorbable distractor devices, minimally invasive surgery and in utero surgery.

A review of the main subtypes of craniosynostosis and craniofacial dysostosis is presented, including their specific clinical features and a commentary on the presently available surgical options.

Keywords: Craniosynostoses; pathology; radiography; surgery; surgery; plastic/methods.

Introduction

Human deformities, especially of the head, have always moved man’s imagination. Craniofacial deformity has at times been regarded as a sign of the supernatural. The Taoist god of long life and luck, Shou-xing, is one typical example, being usually portrayed with an extremely high head. Fukurokuju, the Shinto god of wisdom, is another example also depicted with a very high forehead (Fig. 1). Certain cultures have used particular head shapes as marks of elitist distinction or divinity (Gaudier B et al. 1967). Examples of this are the Incas, Mayas (Fig. 2), Pueblos, Navajos and Apaches in the Americas, the Ethiopians in Africa, the Filippines and the French (Montaut J et al. 1977) (in Brittany, Normandy and especially the Toulouse region, where the practice of skull deformation through bandaging persisted until the end of the XIXth century).

At the same time pathological deformities historically and currently have branded a person with a stigma of inferiority. Homer (Homer et al. 1994) (ca 800 BC) wrote about the warrior Thersites, who “... was the ugliest man who came before Troy ... his head ran up to a point ...”. This description would fit a man with craniosynostosis, and the expression “tête à la Thersite” has been used in French literature as a synonym for oxycephaly.