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**COMPLEXUL OMBILICO-PLACENTAR – SURSĂ DE COLLAGEN
PENTRU APLICAȚII ÎN CHIRURGIA ORO-MAXILO-FACIALĂ**

**UMBILICAL-PLACENTAL COMPLEX – SOURCE OF COLLAGEN FOR
APPLICATIONS IN ORAL-MAXILO-FACIAL SURGERY**

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Abstract: *This paper is focused on the description of sources of collagen such as the umbilical cord, placenta and the types of collagen found in them. It is necessary to mention that, collagen is a fibrous structural protein that is found in abundance in all organs of the human body. In the composition of the bone is found type I collagen, which forms its organic phase and is widely used in the creation of grafts for the regeneration of soft and hard tissues. At the moment, the lack of autologous grafts for oral-maxillo-facial surgery determines the use of bone substitutes, which are a promising trend in this field. This work was supported from the Project with No 23.70105.8007.01T:” Obtaining and testing of composite biomaterials based on umbilical – placental collagen and hydroxyapatite for oral-maxillo-facial surgery”.*

Keywords: *collagen; placenta; umbilical cord; graft; oral-maxillo-facial surgery; biomaterial.*

Introduction

The oral-maxillo-facial region is made up of hard and soft tissues with a complex structure and organization [1]. According to statistics, the most frequent maxillofacial defects are facial lacerations, isolated nasal fractures, penetrating facial injuries, mandibular, zygoma, orbital and pan-facial fractures [2]. Maxillo-facial defects are accompanied by impairment of speech, mastication, swallowing functions and aesthetic problems that influence the psycho-emotional state of patients [3]. In accordance with the high prevalence of soft and hard tissue defects of the maxillofacial region, collagen-based bone grafts are widely used, which would allow the satisfaction of functional, structural, but also aesthetic needs [4]. In the reconstruction of the maxillofacial bones, autogenous, allogeneic and xenogeneic bone grafts and synthetic materials are used. Bone grafts are materials that can be transplanted for the purpose of restoring bone defects. A bone graft has properties such as osteoconduction, osteoinduction and osteogenesis [5].

Autografts. Autogenous bone graft is considered the gold standard in the treatment of post-traumatic disorders of the maxillo-facial region [6]. The autogenous bone graft is harvested from a single anatomical site and transplanted to another site within the same individual [7]. Autogenous bone graft has some properties like osteoconduction, osteoinduction, osteogenesis and represents a true substrate in bone regeneration [8]. The autologous bone graft is limited in stock, has the potential for complications at the donor site and the potential for long recovery [9].

Allografts. The allografts are substrates derived from donors of the same species. Allografts are processed to prevent the transmission of infectious diseases and ensure non-immunogenicity. Properties such as osteoconduction and osteoinduction are characteristic for bone allogeneic grafts [10].

Xenografts. The xenografts are materials of animal origin that are used to regenerate human bone defects [10]. Bone xenografts are obtained from different species by chemical and thermal processing. Bone grafts from animals are frequently used in oral-facial surgery due to their biocompatibility, biodegradability and osteoconduction [11].

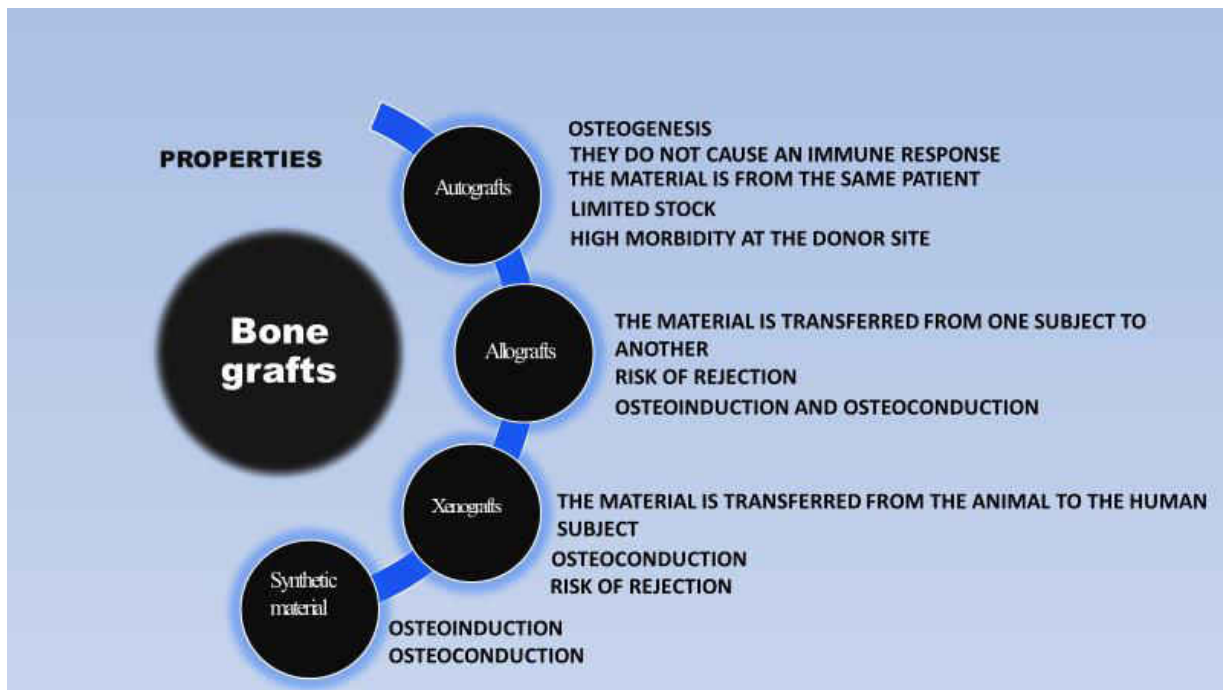


Fig. 1. Properties of different types of bone grafts

Synthetic materials. The synthetic materials are synthetic, inorganic, biocompatible bone substitutes, they have the role of augmentation of bone defects. The feasibility conditions of these materials can be summed up in their ultrastructure, which includes pore diameter, porosity and interconnectivity [12].

Umbilical cord. The umbilical cord represents an element of the fetoplacental unit that has the role of ensuring bidirectional blood flow [13]. The umbilical cord contains a vein and two arteries surrounded by Wharton's jelly and covered by amniotic epithelium [14]. The umbilical vein conducts oxygenated blood from the placenta to the fetus, and the umbilical arteries bring deoxygenated blood from the fetus to placenta. According to the structure Umbilical vessels differ structurally from other vessels of the body [13]. According Bankowski the extracellular matrix of umbilical Wharton's jelly is very rich in striated collagen fibrils organised in large spiral bundles [14].

Placenta. The placenta is a temporary organ with a unique configuration and complex structure due to the interaction between the fetus and the mother. The components of the extracellular matrix of the placenta are different types of collagen such as type I, III, IV, V, VI collagen that have a different tissue distribution [13, 14].
Placenta and umbilical cord

The collagen is a fibrillar structural protein which is part of bone, skin, cartilage, being the most abundant protein in the human body. The gold standard in regeneration of facial bone defects is transplantation of autologous bone tissue, the stock of which is very limited, and the safe utilisation of allogeneic bone grafts depends on the existence of a Human Tissues Bank, qualified personnel to obtain those grafts and donors. Due to its biocompatibility, biodegradability and ubiquity, collagen is a protein of major interest in bone tissue regeneration [15].

Conclusion

The placenta and the umbilical cord present safe and promising sources of collagen that could be used in oral-maxillo-facial surgery as a component of skeletal substitutes due to its properties.

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