CORAL : "THE EXCELLENT BONE GRAFT MATERIAL"

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Man's first use of corals can be traced back almost to 25,000 years as evidenced through small beads of perforated red corals recovered from the burial sites in Europe. These were perhaps used as ornaments and possibility traded by early man. Hard corals have little value for jewellery but are sold in souvenir shops and collected for displays for the expanding marine fish aquarium market. Dead coral rocks and living colonies are mined from reefs and are used for a variety of purposes as building blocks for the construction of buildings, roads, piers and seawalls and for the production of lime and calcium carbide. During the past 19 years, natural coral skeleton has also been successfully used as a bone graft material in most surgical operations.

Corals have been found to be excellent bone graft materials due to their biocompatibility and osteoconductive properties. These are also cheap, widely available and can be easily prepared and shaped . Their porous structure is similar to that of bone. Corals consists of 98-99% Calcium carbonate in the form of aragonite and 1-2% amino acids and oligoelements. According to Bajpoi (1983) an ideal bone graft or substitute should be a material that is biologically inert, readily available, easily adaptable to the site in terms of shape and size and replaceable by the host bone, Coral skeleton when implanted into tissue is progressively resorbed by osteoclasts while at the same time, osteoblasts using the freed calcium ions, produce new bone. The skeletons of two different genera of Madreporararia namely *Acoropora* and *Pocillopora* have been used as onlay graft material for contour augmentation of the face. With coral blocks or granules in a subperiosteal fashion, patients with hemifacial microsomia, maxillary phypoplasia, micro genia and Treacher Collins' syndrome have been adequately treated.

PREPARATION OF THE CORAL IMPLANTS

The two coral genera *Acropora* and *Pocillopora* have been used as onlay graft material. The skeletons of the two genera have the same mineral composition (aragonite) but differ in structure. The *Acropora* skeleton has a significant density and demonstrates highly mechanical properties. Average pore diameter is 500 um and porosity volume is about 12%. The *Pocillopora* skeleton consists of an extremely dense and compact wall surrounding a porous inside body, a structure that closely resembles bone structure. Pororsity volume is about 14% and average pore diameter of the inner part is 725 um.

The organic part of the coral is removed by immersion in a 5% solution of Sodium hypochlorite for 30 hrs. After the soft tissues have been oxidised, the coral is roughly shaped into the desired form with a diamond or metal but before surgical intervention. It can easily be reshaped more precisely during the operation. After the soft tissues have been oxidised, the implant is rinsed in deinonized water for 30 hours and dried at 90°C. Sterilization before implantation is achieved by heating in an autoclave for 30 minuted at 130°C. The coral can also be mechanically fragmented and granules can be used in selected cases.

CONCLUSION

The lack of volume decrease in the coral onlays is encouraging. Their rapid stabilization is probably due to the in growth of connective tissue into implant pores. Coral skeleton acts as a scaffold for direct osteoblastic apposition.

Coral resorption and new bone apposition depend mainly on porosity. The larger the porosity volume, the greater the coral resorption as well as the new bone apposition. Coral onlays would be reliable only if bone formation is equal or almost equal to the primary coral implant volume. The fate of subperiostral coral onlays needs further investigation . Further studies on other coral genera and their related tests on animals are needed.

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