

Review

Historical interest of denture base materials

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ABSTRACT

Complete and partial dentures, as we think of them today, were not definitely recorded until fairly recent times. About the Seventeenth Century, complete and partial dentures emerged in recognized form and from the time of Fauchard, in the early Eighteenth Century this branch of prosthetic dentistry has shared in the remarkable progress that has been characteristic of the modern era. The study of dental history indicates repeatedly the indebtedness of each age to its immediate and remote predecessors. Now here has this been more strikingly revealed than in the field of prosthetic dentistry, dependent as it has been upon material and mechanical development and invention.

KEY WORDS : Box wood denture, Ivory Denture ,Vulcanized rubber

INTRODUCTION

Early prostheses were fashioned by carving denture bases from naturally occurring materials, such as wood, bone and ivory the introduction and development of casting and forging procedures established metal and metal alloys as viable denture base materials. Subsequently, porcelain was used in the fabrication of denture bases despite these advances, additional improvements in the physical and esthetic properties of denture base materials were sought. The selection of specific materials traditionally has been based on availability, cost, physical properties, esthetic qualities and handling characteristics.

REVIEW

During the middle of nineteenth century, Vulcanized rubber (vulcanite)¹⁻³ was introduced as a denture base material. This marked the introduction of polymers in complete denture prosthetics. Vulcanized rubber eventually was displaced by another polymer, poly (methyl / methacrylate)^{4,6} (PMMA) PMMA displayed significant improvements in physical, esthetic and handling properties.

During subsequent years, Polysterene polyvinyl acrylic and polyamides⁷ were used in the fabrication of denture bases. A light activated urethane dimethacrylate also was introduced for denture base applications. None of these materials provided the unique combination of physical and esthetic properties exhibited by PMMA. As a result, PMMA has dominated the denture base arena for more than 50 years.

For years denture bases were fabricated from wood⁸. Wood was chosen because it was available readily, relatively

relatively inexpensive and would be carved to desired shapes denture bases fabricated from wood often warped and cracked in presence of moisture further more posed esthetic and hygienic challenges and was subject to degradation during prolonged periods in the oral environment.

Like wood, bone⁸ was chosen due to its availability, reasonable cost and carvability. It is reported that Fauchard fabricated dentures by measuring individual arches with a compass and cutting bone to fit these arches. Esthetics and hygiene were the main concern.

Ivory⁸ was also used as denture base material. Denture bases and prosthetic teeth were fashioned by carving these materials to designed shapes. They were relatively stable in oral environments further more Ivory bases offered significant esthetic and hygienic advantages in comparison with denture bases carved from wood and bone.

During the later stages of eighteenth century, Dechemont and Duchate introduced porcelain as a denture base material secrets of fabrication of process remained will guarded and porcelain denture bases were relatively expensive. During subsequent years, the secrets of dental porcelain became disseminated more widely. As a result the cost associated with porcelain denture bases decreased and use of ceramic denture bases became more common. Main drawback associated with ceramic was brittleness.

Metals and metal alloys⁹ have been used in construction of dental prosthesis for centuries gold, silver, aluminium and base metal alloys have been used in fabrication of bases for complete dentures. Traditionally gold alloys^{10,11} have been the most popular materials for the

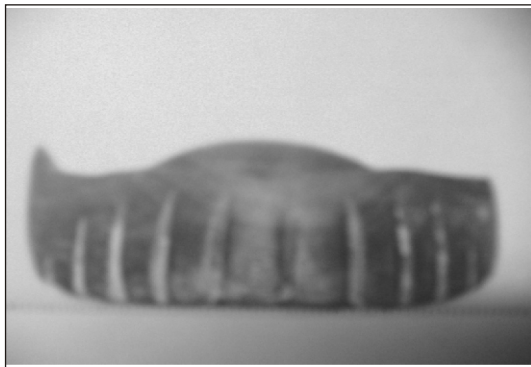


Fig-1.1 : Box wood denture

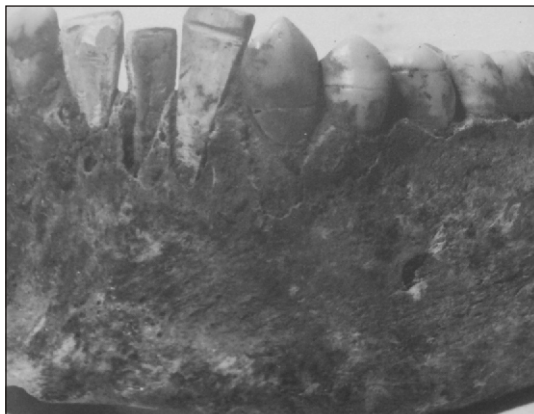


Fig-1.2 : Three pieces of shell in place of natural lower incisors (600 A.D)



Fig1.3 :Ivory Denture

fabrication of metal denture bases. They are well tolerated by patients and do not corrode in oral environment. In addition the increased weight provided by such alloys may be advantages in mandibular complete denture appliances the principal draw back of these alloys is related to high cost.

Denture bases also have been fabricated using Silver¹²⁻¹⁴ and its alloys unlike gold alloys, silver has its alloy exhibit significant corrosion in the oral environment consequently the use of silver and its alloys is contra indicated for extra oral application.

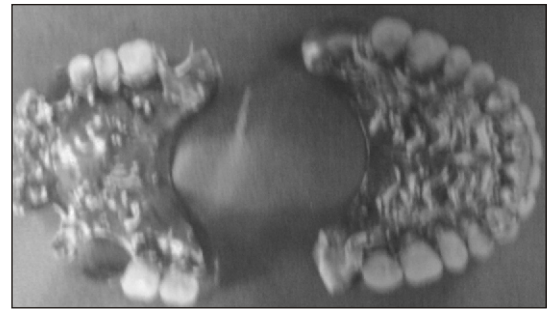


Fig1. 4 :Silver denture base with porcelain teeth



Fig1.5 : Partial denture with silver base and porcelain teeth

Aluminium alloys^{15,16} have been used in fabrication of complete denture bases like gold, aluminium denture bases are well tolerated by patients and do not corrode in the oral environment and potential relationship between aluminium and alzheimers diseases has been reported.

Currently base metal alloys are commonly used. These are relatively strong and may be cast rather accurately. The most promising metal for potential denture base applications appears to be commercially pure titanium. This metal is inexpensive light weight strong and displays excellent biocompatibility.

Since the later half of the nineteenth century, polymers have dominated the denture fabrication process. Vulcanized rubber, polystyrene poly (viny acrylics), polyamides and polymethyl methacrylate have been used in denture base fabrication.

Vulcanized rubber or vulcanite¹⁷⁻¹⁹ was introduced as denture base material in 1855. Vulcanite displayed, questionable, esthetics and the fabrication process was particularly demanding.

During subsequent years, the dental profession sought suitable substitutes for vulcanite. In 1937 polymethyl methacrylate²⁰⁻²⁷ was introduced and rapidly replaced vulcanite as the most commonly used denture base material. Polymethyl methacrylate²⁸⁻³⁴ provided enhanced physical and properties readily available, inexpensive and easily manipulated.

Since the introduction of polymethyl methacrylate³⁵⁻⁴⁰ additional polymers have been tested for denture base applications. Polystyrenes poly (vinyl acrylic) and polyamides that is nylons have been investigated as potential denture base materials⁴¹⁻⁴⁶. Although each of these materials displays desirable properties, none has proved superior to polymethyl methacrylate⁴⁷⁻⁵⁰. As a result the poly methylmethacrylate remains the material of choice for denture base construction.

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