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Review Article

The dental applications of titanium and its alloys: A review

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Abstract

The advances made in dental materials science suggest that intriguing changes will continue to occur in the practice of dentistry. Titanium is one dental material that promises to play an important role in the materials of the future and is a potentially important metal for medical and dental applications, currently being at the heart of most dental implantology. Being biocompatible it is also a suitable replacement for existing alloys in fixed and removable prostheses. Its future use in Prosthodontics would increase based on advanced research and clinical trials. Although the reports on the prosthodontic application of titanium have been increasing, its use in clinical dentistry for conventional removable partial denture is rather limited. This article will present the applications of titanium and reviews the literature on its status in Prosthodontics, especially Removable Prosthodontics by conducting an electronic search of Pub Med and reviewing English language peer reviewed articles from the years 1996-2008 coupled with additional references from citations within the articles. The articles were accessed by using the keyword "titanium, titanium alloys, pressure casting, removable partial denture framework".

Key words: Titanium, Titanium alloy

Introduction

Titanium is a fascinating material being the focus of attention of dental researchers and clinicians. It has been referred to as, "the wonder metal", for two different reasons[1]. One was because it had many unique and wonderful properties. The other being one just had to wonder what role titanium would play in the materials of the future.

The controversy surrounding the biocompatibility of cobalt and nickel containing alloys as potential allergenics and the biological risks of metal ions released in the mouth during corrosion suggests the merits of another base metal alloy as an alternative[2]. Although none of the materials used in dentistry are totally inert, the evolution of titanium as an economical and nontoxic biocompatible replacement for existing alloys for fixed and removable prosthesis has rekindled interest in this wonder metal.

Until recently, the use of titanium for casting and its prosthodontic application was limited, probably because of technical difficulties in the casting procedure. Advances in research, development of new materials and devices for titanium casting has resulted in clinical and laboratory success with titanium based alloys. Its further use in Prosthodontics would increase based on research and trials to compare its effectiveness to other existing and commonly used metals. The purpose of this article is to describe the properties of Titanium and to review its status in Prosthodontics. A literature search of Pub med was performed and English language peer reviewed articles published from 1998- 2008 that addressed the question of the properties of Titanium and its application in Prosthodontics were included. The Medline search was supplemented with a hand search to identify relevant peer reviewed articles published in dental journals.

Titanium: A historical perspective

Although first identified by Gregor in 1791 as Mechanite and rechristened as Titanium by Klaproth after the Titans of the Greek mythology it was Dr. Wilhelm Kroll who invented useful metallurgical processes for the commercial production of titanium and is considered to be the father of titanium industry[3,4].

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