

Role of Resorbable Plates in The Management of Fractures in Maxillofacial Surgeries

D. PRAKASH, VIJAY EBENEZER¹ and R. BALAKRISHNAN

Department of Oral and Maxillofacial Surgery, Sree Balaji Dental College and Hospital, Bharath University, Chennai - 600 100, India.

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ABSTRACT

The aim of internal fixation of skeletal fracture is to achieve undisturbed fracture healing. The need for plates and screws for fixation is only temporary, until the fracture has united. The surgeons usually recommend to remove the metal plates and screws depending upon the symptoms of the patient post operatively. The use of biologically inert resorbable implants would eliminate the need for a second operation for their removal and offers major clinical advantages for the fixation of facial bone fractures in trauma and orthognathic surgery. This article gives a review of the advantages of the resorbable plates over the conventional metal plates in the management of fractures in maxillofacial surgery.

Key words: Resorbable Plates, Fractures, Maxillofacial Surgeries.

INTRODUCTION

The primary goal of fracture management is restoration of healing of fractured bone resulting in restoration of form and function. Malunion, soft tissue breakdown with minimal infection should be included in the overall management of fractures. Various bone fixation materials have been used in maxillofacial surgery. Recently "RESORBABLE PLATES & SCREW" system have attracted attention as an efficient fixation system over the conventional techniques such as fixation with wires and metal-plating system (Francel TJ, *et al*) due to its advantages such as biocompatibility, adequate biomechanical resistance, longer dwelling time, elimination through physiological routes without causing any foreign body reaction.

History

Resorbable plating system were first used as hemostatic vascular clips or surgical suture material (Eppley BL, Sadove AM, *et al*) in 1960. Fabrication of implants was accomplished by melt

moulding and extrusion of polymer into pins and rods. Subsequently more complex designs such as screws and small plates became possible in the late 1970s and early 1980s (Böstman, 1991).

Chemical composition of Absorbable Implants

They are polymeres consisting of varying compositions of polylactic acid and polyglycolic acid copolymers. (Gosain AK, Song L, Corrao MA, *et al*). Many problems such as foreign body reaction, persistence in the body for a longer time have been encountered in the early period of evolution (Bergsma EJ, Rozena FR, Nakamura T, Tajima O, *et al*) whic was due to high molecular weight polylactic acid.

Through rapid development of polymer technology the current materials available are highly biocompatible, and have adequate biomechanical resistance due to which they get eliminated without any foreign body reaction in the body (Eppley BL, Salyer KE, *et al*) .

The alterations in the polylactic acid / polyglycolic acid ratio also has changed the dwelling time in the body and the rate of biomechanical resistance (Peltoniem HH, Tulamo RM, *et al.*).

Mechanism of resorption of the resorbable plates

Resorbable plates and screws get completely excreted through physiological routes. Resorbable plates are composed of alpha hydroxy acid polymer which breakdown through hydrolyzation and their end products are carbon dioxide and water (Eppley BL, Sadove AM, *et al.*).

The degradation of polylactic acid polymers is quite slow owing to their hydrophobic semi crystalline structure. Conversely, polyglycolic acid polymers have a rapid degradation process due to their highly amorphous structure and increased hydrolytic activities (Bos RR, Boering G, *et al.*).

DISCUSSION

Turvey TA, Bell RB, Tejera TJ, *et al.* Stated that resorbable plates have been used as fixation materials in craniomaxillofacial surgery and for rigid fixation in orthognathic surgery.

Titanium plates used for rigid fixation of mandibular fractures allowed the patient to achieve a normal diet and functions of mandible earlier than those patients treated with closed reduction and a period of intermaxillary fixation. This avoids hypomobility secondary to prolonged intermaxillary fixation. Also rigid fixation is believed to result in faster bone repair caused by compression of the fracture segments and lack of mobility between the fracture segments (Gabriella MA, Marcantonio E, Cawood JI, *et al.*)

The disadvantage of a titanium plate over the resorbable plates was that, there were possibilities of removal of plates due to infection which required a second surgery for the patients. But there were no necessary to remove the resorbable plates.

The use of resorbable plates in the management of maxillofacial surgeries was first reported in the literature by Kulkarni *et al* in 1971 (Kulkarni RK, Moore EG, Hegyela AF *et al.*).

Pilot studies were conducted in the early 1970s which concluded that the use of resorbable plates and screws were not mechanically adequate without intermaxillary and was excessive in thickness for the use in craniofacial surgeries (Cutright DE, Getter L, *et al.*)

Gerlach KL was the first person to give reference to the fixation of zygomatic fractures with melt-molded poly L lactic acid plates and screws.

Later in 1997 poly L lactic acid miniplate fixation system for facial fractures was introduced by Bessho *et al.*

Self-reinforced PLA miniplates was also been described by Haers *et al.*

The main advantage of the resorbable plate is that it provides proper strength when needed and then degrades over time without any reaction to the body.

Kim YK, Ylikontiola L *et al* have described that resorbable plates have reached to a point where their physical properties are sufficient to withstand the postoperative loads required for fracture repair.

CONCLUSION

The use of resorbable plates is more safe than that of conventional mini plates. The resorbable plates have a major advantage of self resorption due to their polymer composition Poly glycolic acid and poly lactic acid. Miniplates are present in the fracture site for life long due to which it gets infected in few patients, but resorbable plates resorb over a period of time, Due to which there is no need of second surgery for removal of plates.

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