Lab Note

Polishing of cast metal denture frameworks: An alternative technique

Rodrigues S[1] , Shetty P[2]

[1]Professor & Head. [2]Former Professor Deparment of Prosthodontics, Manipal College of Dental Sciences, Manipal Academy of Higher Education Mangalore, Karnataka, India.

Abstract

Commercial laboratories rely on electro polishing to facilitate finishing and polishing of cast metal frameworks. The aim of this article is to describe an alternative method to electropolishing of cast metal RPD with minimal loss of mass.

Key Words: Cast metal RPD, finishing and polishing, loss of mass

Introduction

Finishing and polishing constitutes an essential requisite following the fabrication of cast metal frameworks. Despite their favourable properties, most cast partial denture frameworks are difficult to grind and polish on account of their hardness restricting their use in dental practice[1,2,3,4,5,6].Although advances in management techniques, improvements in the alloy composition have enhanced working characteristics of these alloys, thereby decreasing their surface roughness, most of these procedures are delegated to commercial laboratories which rely on electro-polishing to facilitate finishing.

Electro polishing is defined as the electrolytic removal of a thin layer of metal to produce a bright surface[7]. It is essentially the opposite of electroplating. If a rough metal surface is connected as anode, in a bath of strongly acid electrolyte, a current passing between it and the cathode will cause the anode to ionize and lose a surface film of metal. With a suitable electrolyte and the correct current density the first product of electrolysis will collect in the hollow of the rough metal surface and so prevent further attack in these areas. The prominences of the metal surface will continue to be dissolved and in this way the contour of the surface are made smooth[8] and the removable partial denture (RPD) framework, is polished both on its external and intaglio surface. Considerable loss of RPD framework metal during finishing and polishing techniques results in poor fit of retentive clasp arms and improper contact at the tooth-clasps interface, thus affecting the retention and stability of the RPDs,[9] especially in thinner areas possibly causing structural weakening.

Aydin[10] assessed the effect of finishing and polishing on surface roughness of cobalt-chromium castings and reported that appropriate smoothing techniques are fundamental for contouring. This approach may improve oral health, decrease plaque retention, and increase alloy resistance to corrosion. A past study compared the effect of casting technique on surface roughness and mass loss for cobalt chromium and nickel chromium alloys compared to pure titanium and reported no significant loss of mass.[11] However, as expected, there is a tendency towards greater loss of mass for specimens that were rougher initially and with larger components and more surface area to be polished. Less initial roughness prevents possible weakening of the structure and also contributes to improved internal surface smoothness of RPD components in contact with the mucosa or teeth where access is frequently difficult. Hence vacuum casting and the control of the casting temperature to prevent overheating of the materials and, consequently, preclude the creation of porosities by volatilization of components with lower fusion temperatures are recommended.

The aim of this article is to describe an alternative method of polishing of cast metal RPD with minimal loss of mass.

Correspondence: Dr Shobha J Rodrigues, Department of Prosthodontics & Maxillofacial Prosthetics Manipal College of Dental Sciences, Manipal Academy of Higher Education, Mangalore, Karnataka, India, Email:ereldiaz@yahoo.com

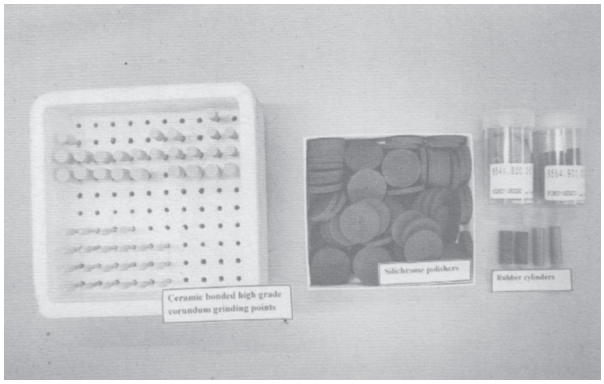

Figure 1: Tools used for polishing

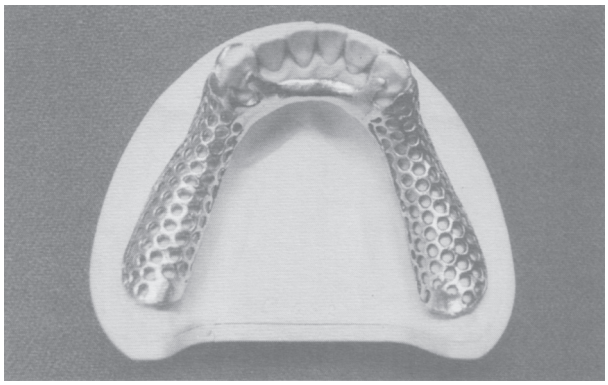

Figure 2: Finished and polished framework

Procedure:

1 Following recovery, sandblast the cast framework to remove adhering investment particles (Automatic blasting unit & Microblaster; Dentaurum, Pforzheim, Germany). Sandblasting removes the adherent film of investment particles and oxides.

2. Cut off the sprues using separating discs (T-Separating discs; Dentaurum).
3. Each grinding and polishing technique is carried out using high speed polishing motor (Dentaurum) and light pressure .
4. Follow a systematic sequence with each abrasive point till its work is completed and before the next step has begun.
5. Finish and smoothen the framework initially using sintered diamond (Diasint; Dentaurum).
6. Use the following sequence to further the finishing
   a. Ceramic bonded high grade carborundum grinding points coarse followed by medium (Brown and Pink :135-201&132-801 Grinding Points; Dentaurum)
   b.Use Silichrome polishers (Dentaurum) which are efficient in reducing the polishing time.
7. Smoothen the framework using rubber cylinders and discs (Dentaurum) :black followed by grey and green. (Figure 1)
8. Use felt disk and brush wheel with slurry of zinc oxide and polyethylene glycol to eliminate tracers of rubber point marks .
9. Use felt mops and softbrush ,wheels in conjunction with polishing paste(Green & Yellow :Dentaurum) to achieve a polished and lustrous appearance.
10. Remove all polishing paste residues in a ultrasonic cleaner and the framework is tried on the cast (Figure 2).

Discussion

The importance of the finishing and polishing techniques for removable partial denture frameworks cannot be underestimated. Most commercial laboratories rely on electro polishing to facilitate finishing. This alternative method of polishing of cast metal RPD with minimal loss of mass has the advantage of better fit,simplicity with no special polishing equipment is required. However it is more laborious and time consuming. While the best surface finish can be obtained by usage of sand blasting, hardstones, abrasive discs and electropolishing in conjunction and progressively,this simple technique provides an alternative method of polishing with minimal loss of mass.

References:

1. Lanier BR, Rudd KI), Strunk RR. Making chromium-cobalt removable partial dentures: a modified technique. J Prosthet Dent 1971 ;25: i 97- 205.
2. Taylor DF, Leibfritz WA, Adler AG. Physical properties of chromium-cobalt dental alloys. J Am Dent Assoc 1958;56:343-351.
3. Lane JR. A survey of dental alloys. J Am Dent Assoc 1949;39;414-437
4. Cunningham DM. Comparison ofbase metal alloys and type IV gold alloys for removable partial denture frameworks. Dent Clin North Am 1973;17;719-722
5. Dharmar S, Rathnasamy RJ, Swaminathan TN. Radiographic and metallographic evaluation of porosity defects grain structure of cast chromium cobalt removable partial dentures. J Prosthet Dent 1993;69:369-373
6. Anusavice K J. Phillips Science of Dental materials.In:Dental casting and soldering alloys ed I lth Elselvier Saunders2003. p. 431-7.
7. The Glossary of Prosthodontic terms.J Prosthet Dent 2005; 94: 35.
8. John F Mccabe, Angus WG Walls. Applied Dental Materials. 8th ed. Blackwell Publishing. Third Indian reprint-2006 In: Base metal casting alloys.p. 64.
9. Sato Y. Clinical methods for adjusting retention force of cast clasps. J Prosthet Dent 1999;82:557- 561.
10. Aydin AK. Evaluation of finishing and polishing techniques on surface roughness of chromium- cobalt castings. J Prosthet Dent 1991;65:763-767.
11. Osvaldo L B, Hamilton P, Tânia B C .Effect of and casting technique on surface roughness consequent mass loss after polishing of NiCr and COCr base metal alloys: a comparative study with titanium J Prosthet Dent 2004;92.