A comparative study on the accuracy of vertical height of complete dentures with conventional flasking and flasking incorporating a peripheral wax spacer

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Abstract

With compression molding technique, excess resin (flash) is displaced onto the land area. After processing it has been observed that acrylic resin flows onto the land area causing an increase in vertical height of the dentures.

Objective: To compare the accuracy of vertical height of complete denture with conventional flasking and flasking incorporating a peripheral wax spacer.

Methodology: Twenty maxillary trial dentures were fabricated. Metallic discs of diameter 3mm were inserted at the center of the buccal surfaces of 1st molar, 1st premolar and lateral incisor of the trial denture on both the sides. Metallic discs were also inserted in the cast to facilitate measuring vertical height before and after acrylization. Specimens were divided into two groups. First group trial dentures were conventionally flasked and second group trial dentures were flasked incorporating a peripheral wax spacer. After acrylization the dentures were retrieved with the cast and the change in the vertical height of the dentures were measured and compared.

Results: With conventional flasking, the increase in mean vertical height on the right side was 0.44±0.14mm in the molar region, 0.35±0.18mm in the premolar region, 0.37±0.19mm in the lateral incisor region. On the left side, 0.40±0.12mm in the molar region, 0.33±0.11mm in premolar region, 0.35±0.14mm in lateral incisor region. With flasking incorporating peripheral wax spacer, the increase in mean vertical height on the right side was 0.11±0.10mm in the molar region, 0.11±0.09mm in the premolar region, 0.05±0.04mm in the lateral incisor region. On the left side, 0.10±0.09mm in the molar region, 0.09±0.06mm in the premolar region, 0.06±0.05mm in the lateral incisor region. The results were subjected to wilcoxon signed ranks statistical test.

Conclusion: Flasking with peripheral wax spacer was more accurate in maintaining the vertical height of the denture compared to conventional flasking procedure. Hence change in vertical height of denture can be minimized by incorporating a peripheral wax spacer during flasking procedure.

Keywords: Compression molding, vertical height, peripheral wax spacer

Acrylic resin polymers were introduced as denture base material in 1937. By 1946, 98% of all denture bases were fabricated from polymethyl methacrylate (PMMA) or copolymers. Today, majority of the dentures are made from heat-cured PMMA1. Compression molding is the conventional technique described for the processing of dentures2,3. Acrylic resin in the form of dough is compressed into the mould with incremental loading. Slow application of pressure permits the resin dough to flow evenly throughout the mold space. Excess resin (flash) is displaced onto the land area. Flash is removed completely before finally closing the mould. After processing it has been ob-
served that acrylic resin flows on to the land area causing an increase in vertical height of the dentures. The resin flow happens above the glass transition temperature. It is hypothesized that if a recess is incorporated, the possibility of increase in vertical height can be controlled. The spacing can be achieved by the incorporation of a peripheral wax spacer during the flasking of trial denture. This would provide space for the resin expressed during the processing. The objective of this study was to compare the accuracy of vertical height of the complete dentures processed with conventional flasking and with flasking incorporating a peripheral wax spacer.

Materials and methodology

Preparation of wax try in dentures

Twenty maxillary edentulous casts were made with type IV stone from a silicone mold. A temporary denture base was fabricated on the cast. Anterior and posterior teeth were arranged on the denture base to prepare the trial denture (Fig 1). An index of the try in denture was made using addition polyvinylsiloxane impression material (Affinis, Switzerland) (Fig 2). This index was used to fabricate twenty wax try in dentures.

Preparation of trial dentures for measurement

Metallic discs (Fig 3) of diameter 3mm were placed both in the trial denture and casts. For its placement, 3mm diameter recesses were drilled in the teeth of the trial denture and the cast as well. On both the sides of trial denture, metallic discs were fixed onto the buccal surfaces of 1st molar, 1st premolar and lateral incisor with autopolymerizing acrylic resin (Fig 4). Discs were also placed into the corresponding regions in the casts such that the vertical distance between the discs was 21.2 mm in molar region, 22 mm in premolar region and 18.5 mm in lateral incisor region. Cyanoacrylate resin was used to hold the discs in the cast. The distance between the center of the metallic discs placed on the teeth and center of the metallic discs placed at the corresponding areas on the cast indicated the vertical height of the denture.

Flasking of try in dentures

The specimens were divided into two groups. The trial dentures flased using conventional method served
as the control (C1-C10) (Fig 5). The trial dentures flasked incorporating a peripheral wax spacer were the experimental group (P1-P10) (Fig 6). A double layer of wax with a width of 5mm was used to form the spacer. This was placed all around 5mm away from the cast borders (Fig 7).

**Dewaxing and acrylization**

After flasking, specimens of both the groups were dewaxed (Fig 8). Once the molds were obtained, packing with heat cure acrylic resin and trial closure was done. Two overlapping cellophane sheets were placed between the major portions of the flask, and the flask assembly was placed in the press to compress the resin. The mould was then separated and flash was removed. After the flash was no longer apparent, definitive closure of the mold was accomplished. The mold sections were properly oriented and placed in the flask press. Then the specimens were processed at 74°C for 2 hours followed by 1 hr of processing at an increased temperature of 100°C. The acrylized dentures were deflasked and retrieved along with the casts (Fig 9). The dentures were trimmed without touching the border areas. Measurements were again taken using the digital caliper (Fig 10).

**Results**

With conventional flasking, the increase in mean vertical height on the right side was 0.44±0.14mm in the molar region, 0.35±0.18mm in the premolar region, 0.37±0.19mm in the lateral incisor region. On the left side, 0.40±0.12mm in the molar region, 0.33±0.11mm in premolar region, 0.35±0.14mm in lateral incisor region. With flasking incorporating peripheral wax spacer, the increase in mean vertical height on the right side was 0.11±0.10mm in the molar region, 0.11±0.09mm in the premolar region, 0.05±0.04mm in the lateral incisor region. On the left side, 0.10±0.09mm in the molar region, 0.09±0.06mm in the premolar region, 0.06±0.05mm in the lateral incisor region (Table I). The results were subjected to Wilcoxon signed ranks statistical test. The increase in mean vertical height between the dentures processed with conventional flasking and flasking incorporating peripheral wax spacer in molar, premolar and lateral incisor regions on both the sides were found to be statistically significant (P<0.05). The increase in mean vertical height with flasking incorporating peripheral wax spacer was significantly less than that with conventional flasking on both the sides of the processed dentures at all the three regions.

**Discussion**

The results of the present study showed that irrespective of the technique used there was an increase in vertical height of the dentures, following processing. This could be attributed to the flow of resin between the parts of the mould and that might have occurred above the glass transition temperature. The glass transition temperature of resin is 105 °C. A significant increase in vertical height of the dentures was noticed when the dentures were processed by conventional flasking. On the contrary, when the spacer was incorporated the increase in vertical height was significantly less. This is because, when a peripheral space is incorporated, the excess material could be accommodated without causing an increase in height. In other words the recess provided space for the resin expressed during processing and minimised the increase in vertical height.

**Conclusions**

Flasking incorporating a peripheral wax spacer showed less change in vertical height than conventional flasking. Hence flasking with peripheral wax spacer was more accurate in maintaining the vertical height of the denture compared to conventional flasking procedure.

**References**


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