Clinical Evaluation of a New Resilient Denture Liner in Long-term Use

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The new resilient denture liner “M*” was evaluated for adhesion, color stability, surface texture, tissue response, deterioration and denture base stability, at periods of 1 month, 3 months and about 30 months after denture liner application. At the observation of approximately 30 months, the usage of 17 dentures had been discontinued within 2 years, and 6 dentures continued to be used. It could be considered that the main reasons why 17 dentures were discontinued were poor fitting caused by deterioration, and a decrease in the strength of the denture base caused by the denture liner lining. It was suggested that “M” was appropriate for long-term use (about 2 to 3 years), if patients faithfully practice denture cleaning, and if the strength of denture base is considered.

Key words: Resilient denture liner, Clinical evaluation, Long-term use

INTRODUCTION

Recently, there is an increase in the number of aged patients all over the world. Consequently there are many cases in which the mucosal supporting tissue is thin and shows a reduction in surface area. Whereas for youth, anabolic processes are predominant, for the aged, catabolism is dominant and atrophy results. When a load is applied through hard denture bases in these cases, pain is very likely to result. A variety of resilient denture liner materials have been applied as a cushion between hard denture bases and mucosal supporting tissues. This therapy is designed to replace the missing resilient tissue layer covering the residual ridge by a similar layer on the base of the denture.

A suitable resilient liner must be inert in the oral environment; it should not cause tissue reaction, support the growth of fungus. A suitable liner should also adhere to the denture base and should be durable and have a pleasing appearance. To date various materials have been developed, but a satisfactory resilient denture liner is not yet available.

This report gives observations collected during about 30 months of clinical study on the use of the resilient denture liner “M”. Liner M is rubber cushioning material that is plasticized with polyolephin.

MATERIALS AND METHODS

Selection of subjects

* MOLTENO, Molten Co., Hiroshima, Japan
Sixteen women and twelve men between the age of 38 and 80 years were selected as subjects, and their protheses were relined with M. The test dentures included: (1) twenty mandibular complete dentures opposed by maxillary complete dentures (which were not relined); (2) five maxillary complete dentures — three opposed by complete mandibular dentures and two by class I removable partial dentures; (3) two mandibular removable partial dentures — one opposed by a maxillary complete denture (which was not relined), and one by a class I removable partial denture; (4) one maxillary removable partial denture opposed by natural teeth.

Test procedures

The occlusion of the prostheses and dentitions were equilibrated before the relining procedures were started. Impressions were made by a closed mouth technique, but with only enough occluding pressure to preserve the occlusal relationship. After making an impression, the test dentures were boxed and poured in dental stone. The test dentures on the cast were mounted on an articulator for relining, and an occlusal template was made with a jig. The dentures were removed from the articulator, and guide holes (Ø 1 mm) were prepared on the basal seat covered by impression material. The impression material was then eliminated as determined by guide holes. The basal seat at the borders was cut in a V-shape to prevent it from peeling off. Next, the dentures were fit back onto the occlusal template and were waxed between the cast. Then, the dentures were separated from the occlusal template and flasked with their casts. The flask was placed in boiling water, and the surplus wax was washed out with a stream of boiling water after the flask had been opened. The resin surface was painted with an adhesive agent and dried by a special dryer for one minute. This procedure was repeated two times. Liner M was then placed on a tray and heated and softened by a heating apparatus for 3 to 4 minutes. Liner M dough was placed on the resin surface, and immediately the flask was closed in a press. Attention was paid to keeping approximately 1 mm of space between the two halves of the flask during the pressing procedure. The flask was transferred to a special spring clamp, and closed completely for approximately 15 minutes in boiling water. The dentures were processed for 15 minutes in water held at a constant temperature of 120° C in a pressure pot, and then the pressure in the pot was maintained for 30 minutes. Next, the flask was allowed to cool at room temperature, and the dentures were removed from the stone and cast, and polished carefully. Except for the basal seat, the surface was polished with a special polishing instrument**.

The relined dentures were adjusted and placed in the subjects' mouths. The subjects were recalled after 1 month, and after 3 months. At each appointment the dentures were evaluated on their adhesion, color stability, surface texture, tissue response, deterioration and denture base stability. In addition, after 2 years, 23 of the 28 subjects who agreed to cooperate in this study were recalled for examination and evaluation.

All the dentures were evaluated by means of three grades (no change, moderate change, and significant change) for each observation.

1. Adhesion

No change (N.C.): No loss of adhesion

** Polishing roller, Molten Co., Hiroshima, Japan
Moderate change (M.C.): Loss of adhesion is limited to small segments of the border, and has no effect on mastication.

Significant change (S.C.): Loss of adhesion spreads beyond the border.

2. Color stability
   - N.C.: No color change
   - M.C.: Color change is limited to small areas.
   - S.C.: Color change spreads over wide areas.

3. Surface texture
   - N.C.: No change
   - M.C.: Texture change (loss of luster, or loss of smoothness) is limited to small areas.
   - S.C.: Texture change spreads over wide areas.

4. Tissue response
   - N.C.: No change
   - M.C.: Only redness, and it is limited to small areas.
   - S.C.: Swelling, or redness spreads over wide areas.

5. Deterioration
   - N.C.: No finding
   - M.C.: Deterioration (loss of resilience, or occurrence of surface porosity) is limited to
small areas.
S. C.: Deterioration spreads over wide areas.
6. Denture base stability
   N. C.: No loss of stability
   M. C.: A little loss of stability but with no effect on mastication
   S. C.: Loss of stability with effect on mastication

RESULTS

After 1 and 3 months of use (Table), the border adhesion was slightly weak in 4 dentures. A yellowish brown discoloration occurred in 6 dentures and only one denture fit poorly. All supporting tissues had a normal appearance, and there appeared to be no harmful effects on the denture base material. Also, there were no cases of surface texture change or deterioration change.

After approximately 30 months of denture liner application (Fig. 1), 6 dentures continued to be used. Figure 2 and Fig. 3 show these excellent cases whose only change was a slight discoloration.

Seventeen dentures of the remaining cases, were descontinued within 2 years; 5 produced pain during mastication, 4 showed denture base fracture, 3 led to the extraction of abutment teeth, 3 resulted in a loss of border adhesion, 1 led to deterioration and 1 was lost.

DISCUSSION

The new resilient denture liner M is safe to use in contact with oral tissue. A yellowish brown discoloration was observed on most of the dentures, and the original color recovery which was observed in a few cases was a passing phenomenon. Therefore, it was suggested that the yellowish brown discoloration was caused by pigmentation. However, clinically the discoloration had no effect on surface texture, deterioration and resilience. The border adhesion was slightly weak. The border junction between the resilient liner and the denture base should be a V-shaped joint. The finish should be well away from the borders of the flange. Slight deterioration was observed in many dentures, especially in the cases in which the dentures were not cleaned with denture cleaner.

In this study, the usage of 17 dentures was discontinued because of pain during mastication. This pain is considered to be caused by deterioration or ill-fitness, and the decreasing strength of the denture base caused by the denture liner lining. Thus the denture lined with a resilient liner should be cleaned with denture cleaner, and dentists should be careful of the strength of the denture base.

Resilient denture liners in themselves should be considered as temporary expedients1-5). However in this study, it was observed that 6 dentures continued to be used after 30 months of denture liner application.

From the facts described above, it was suggested that the resilient denture liner M could be used in the long term (approximately 2 to 3 years), if patients faithfully practice denture cleaning, and it is possible that lined dentures are sufficiently strong even after being lined.
Fig. 2  Case 1; male, 83 years old, after 28 months of use.

Fig. 3  Case 2; male, 58 years old, after 28 months of use.
CONCLUSION

This paper reports clinical observations made on 28 subjects who wore dentures. The dentures were lined with M. observations that were made during the 3-month and 30-month study led to the following conclusions.

1. Liner M is safe to use in contact with oral tissue.
2. The border junction between the resilient liner and the denture base should be a V-shaped joint. The finish line should be well away from the borders of the flange.
3. It was suggested that M could be used in the long term (approximately 2 to 3 years), if patients faithfully practice the denture cleaning and it is possible that lined dentures are sufficiently strong even after being lined.

REFERENCES

新しい義歯床用軟質裏装材Mの長期使用における臨床的評価
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広島大学歯学部歯科補綴学第一講座

近年、ポリオレフィン系高分子を主成分とする新しい義歯床用軟質裏装材Mが開発された。このポリオレフィン系高分子化合物は化学安定性に優れており、従来の軟質裏装材に代わる新素材として注目される。このMを有床義歯装着者28名に対して裏装し、約2年6ヶ月後の予後観察を行った。その結果、約2/3の症例が2年以上に再裏装が必要となったが、8名は現在なお材質の劣化を認めることなく使用を継続しており、生体安全性はもとより、長期間の使用にも耐え得る材質であることが示唆された。再裏装の必要性が生じた主な原因としては、劣化もしくは不適合による咀嚼時疼痛の再発、および裏装による義歯床の機械的強度の低下などが考えられる。したがって、患者に対する義歯洗浄剤使用による義歯の洗浄指導の徹底と、裏装後の義歯床の機械的強度に関しては、十分考慮する必要があると考えられる。

試作ガリウム合金の臨床的研究
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水銀を用いない歯科用金属合成材料として試作開発されたガリウム系合金の臨床応用の可能性を検討するため、この試作合金による大臼歯、または小臼歯咬合面のI級修復物について、1年間の臨床経過を経時に観察した。
今回用いた試作合金は、Ag, Sn, Cu, Pd から構成された球状粉末合金とGa, In, Sn, Ag系微粒子合金を市販のアマルガムミキサーによって練和し、従来のアマルガム修復に準じた手法によって塗布した。
その結果、この試作合金は、口腔内で1年を経過するとき、観察した17症例すべてに、多かれ少なかれ変色、表面粗れ、辺縁破折などが観察され、前報者が報告した高鉱型アマルガム合金の臨床経過と比較しても、この試作合金を直ちに高鉱型アマルガムに代用させるには、今後さらに改良の必要があることが判明した。

コンポジットレジンの象牙質窩洞適合性
藤光 健，加藤裕正，伊藤和雄，和久本貞雄
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市販の各種コンポジットレジンの象牙質窩洞における窩壁適合性を検討するために、EDTAによって清掃し、35％HEMA水溶液によるデンティングプライマー処理を施した象牙質円柱窩洞に、市販のボンディング材を塗布後各種市販コンポジットレジンを塗布し、窩洞適合性を検討するとともに、これらコンポジットレジンの焼却前