

Examination of the Iraqi-product lathe-cut dental amalgam alloy by using "Taha Indicator". Microscopic investigation

Lamia T Rejab

BDS, MSc (Assist Lect)

Nadia H Hasan

BDS, MSc (Assist Lect)

Munther N Kazanji

BDS, MSc (Assist Prof)

Department of Prosthetic Dentistry

College of Dentistry, University of Mosul

ABSTRACT

Many dental materials have been marketed locally in the last few years. The dentist should understand the selection principles that based on scientific tests to choose the product.

Dental amalgam alloy is one of the dental materials that used in restorative dentistry for restoration decayed teeth.

The primary objective of the study is to examine the lathe-cut Iraqi dental amalgam alloy (Al-Rafidain) microscopically. The examination of alloy powder particles shape was made with transmitted light microscope using "Taha Indicator" instead of reflected light microscope or electron microscope.

The results showed that the examination with transmitted light microscope by using "Taha Indicator" give obvious and clear image of the alloy powder particles and also showed that Al-Rafidain amalgam alloy powder has large and irregular shape particles that may give inferior physical properties to the product, so more evaluation and examination by other related tests may be needed.

Key Words: Microscopic examination, Taha Indicator, dental amalgam, lathe-cut.

الخلاصة

لقد أنتجت الكثير من المواد السنية وقدمت إلى الأسواق خلال السنوات القليلة الماضية بشكل كبير، فعلى طبيب الأسنان أن يفهم مبادئ اختيار المواد السنية القائمة على اختبارات علمية لاختيار افضل منتج.

إن مادة الأملغم هي إحدى المواد السنية المستخدمة في العلاج التحفظي لمعالجة الأسنان المسوسة والمنخورة.

هدف الدراسة هو الفحص المجهرى لمنتج الأملغم العراقي (الرافدين) بواسطة المجهر الضوئي الاعتيادي باستعمال "كاشف طه" بدلا من مجهر الضوء المنعكس أو المجهر الإلكتروني.

أظهرت النتائج أن الفحص المجهرى بواسطة المجهر الضوئي الاعتيادي باستعمال "كاشف طه" أعطى صور واضحة لشكل جزيئات الأملغم وكذلك أظهرت أن جزيئات مسحوق أملغم الرافدين كانت كبيرة وغير مرتبة والتي قد تعطي صفات فيزيائية متدنية للمنتج، لذلك فإنها قد تحتاج إلى المزيد من الفحص والتقييم بواسطة اختبارات أخرى.

INTRODUCTION

Many dental materials have been developed and marketed locally in the last few years. To aid the practitioners and dentists to choose the best products for

certain treatment, the dentist should understand the fundamental and principles of selection of these materials. These principles should be based on the scientific tests and examination.⁽¹⁻⁴⁾ One of these exam-

inations is microscopic test to examine the powder particles shape.

Dental amalgam is one of the most widely used materials in conservative dentistry as a restorative material for restoration decayed teeth. Dental amalgam

produced from dental amalgam alloy powder that mixed with mercury.^(2,4-6)

Traditional dental amalgam alloys come as either lathe-cut or atomized (spherical) particles. Alloy may also be supplied as mixture of lathe-cut and spherical particles as shown in Figure (1).^(1,4-7)

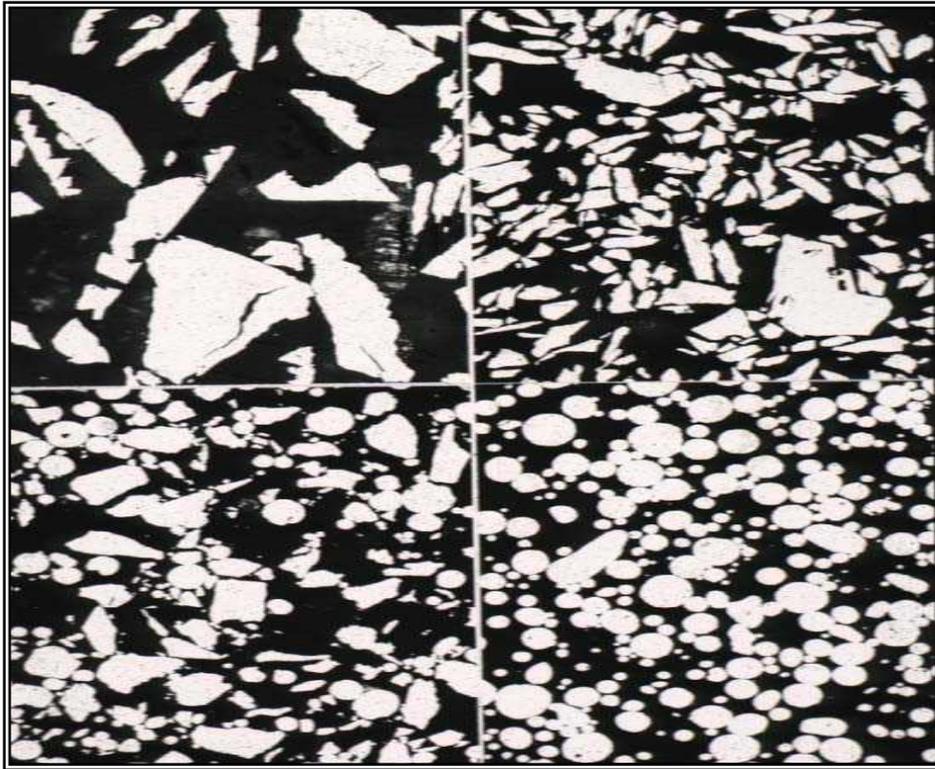


Figure (1): Different alloy particles shape⁽⁴⁾

Dental amalgam alloy particle shape, size and composition determine the properties of the amalgam; so formulation has been adjusted to improve their physical properties and preparation design taking maximum advantage of inherent properties and limitation of the materials.

The primary objective of the study is to evaluate a lathe-cut Iraqi-product dental amalgam alloy microscopically with transmitted light microscope by using "Taha Indicator" (which is a transparent fluid oil, used as a lubricant for sewing machine; chemically is one of the saturated cyclic hydrocarbons which is relatively inert, don't react with most of common acids, bases or oxidizing or reducing agents),⁽⁸⁻⁹⁾ and compare its particles shape and size with other types of spherical dental amalgam alloy products microscopically.

MATERIALS AND METHOD

The dental amalgam alloys that were examined microscopically in this study are Al-Rafidain (71% silver tin, Lathe-cut alloy, Al-Zahra Dent Lab. Iraq), spherical alloy Vivacap (Vivadent, Ets, FL-9494 Schaan/Liechtenstein) and Admixed dental amalgam alloy (mixture of spherical and Lathe-cut shape particles) Aristaloy 21 (Engelhard-Clal. Chessington, Surrey KT9 1TD, England).

The specimens were prepared by mixing 1 mg of the dental amalgam alloy powder with drop of "Taha Indicator" on glass slide, then covered with cover slide and examined under a transmitted light microscope at ($\times 400$).^(9,10)

The specimens were examined and photographed with photomicrograph microscope (Olympus BH2, Japan).

RESULTS AND DISCUSSION

The results of microscopical examination with transmitted light microscope by using "Taha Indicator" gave clear and obvious images of the examined specimens of the different types of dental amalgam alloys which reveal the different powder particles shape that give benefit to differentiate and compare between the different types of amalgam alloys by this easy and fast microscopic test with low cost in comparison with other complicated and expensive microscopic method and instruments like reflected microscope and

electron microscope and this results agreed with the findings of other studies.⁽⁹⁻¹¹⁾

The result of the microscopic examination of Al-Rafidain lathe-cut alloy revealed a large irregular-shape particles as shown in Figure (2). The small spherical shape of the powder particles of Vivacap is shown in Figure (3). This result agreed with the findings of other studies.⁽²⁻⁴⁾ While Figure (4) shows the particles shape of Aristaloy 21 dental amalgam alloy which are numerous small spherical particles mixed with few number of rod like particles. The two particle types present in the admixed dental amalgam alloys separated during storage of the powder.⁽⁷⁾

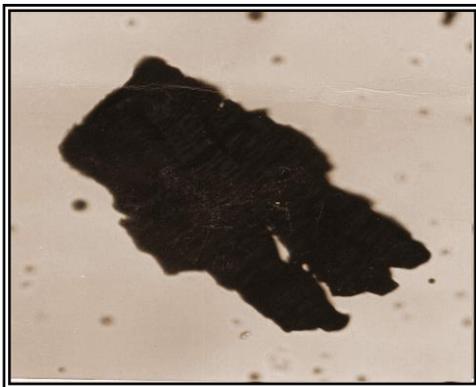


Figure (2): Al-Rafidain alloy ($\times 400$).
Large irregular lathe-cut particles

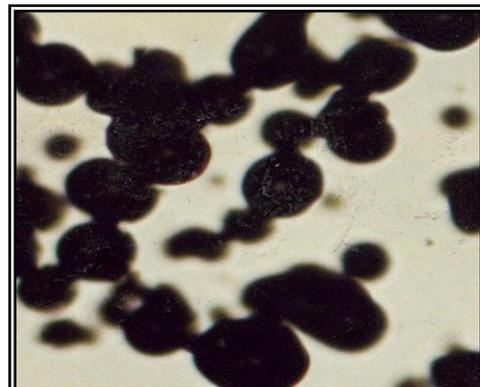


Figure (3): Vivacap alloy ($\times 400$).
Small spherical particles

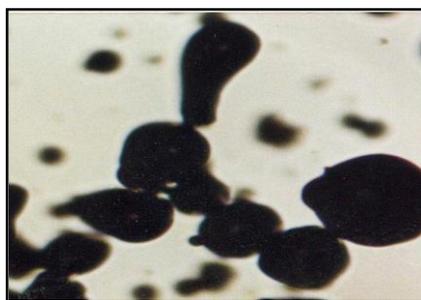


Figure (4): Aristaloy 21 alloy ($\times 400$).
Mixed spherical and lathe-cut particles

The results showed that Al-Rafidain alloy has irregular shape particles, larger in size than the other two tested products. The large lathe-cut irregular shape particles of the alloy need more mercury for amalgamation than small spherical particles alloy because that the spherical parti-

cles of alloy have a smaller surface area per volume than do the large lathe-cut alloy; so amalgam with a high mercury content have inferior physical properties, like more creep, high setting expansion that cause unsupported amalgam protrudes from the margin of the cavity and lead to

marginal leakage as a main disadvantage of the amalgam restoration,^(2, 5, 12, 13) lower value of strength, and also the larger particles during carving may be pulled out of the matrix that producing a rough surface. Such surface is more susceptible to corrosion than a smooth surface.^(3,4) The trend in amalgam technique favor the use of small average particle size and many alloy powder are formulated by mixing particles of varying size or even shape to increase the packing efficiency of alloy and reduce the amount of mercury required to produce a workable mix.⁽²⁻⁴⁾ So, Al-Rafidain product may has an inferior physical properties and need more evaluation and examination that aids to improve its properties.

So that the dentists should depend on a scientific methods of evaluation and examination like the microscopic examination and other related tests to select the proper products, and to get a maximum advantages of the materials.

CONCLUSIONS

Microscopic examination of the powder particles shape of the dental amalgam alloys with transmitted light microscope by using "Taha Indicator" give obvious and clear image of the different types.

The microscopic examination revealed that the Iraqi-product (Al-Rafidain) dental amalgam alloy has large and irregular shape powder particles and this might produce amalgam with inferior physical properties.

Al-Rafidain alloy need more examination and evaluation by other related tests that could be aid to improve its properties and efficiency.

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